# "A CROSS SECTIONAL STUDY TO RELATE THE STAGES OF PARKINSON'S DISEASE WITH COGNITIVE DEFICITS, FALLS AND ACTIVITIES OF DAILY LIVING"

**Dissertation submitted to the Tamil Nadu Dr. M.G.R. University, Chennai in partial fulfillment of the requirements for the Degree of**

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**THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY, CHENNAI**

# CERTIFICATE

This is to certify that the research work entitled, **"A CROSS SECTIONAL STUDY TO RELATE THE STAGES OF PARKINSON'S DISEASE WITH COGNITIVE DEFICITS, FALLS AND ACTIVITIES OF DAILY LIVING"** was carried out by **(Reg.No.411514002)** KMCH College of Occupational Therapy, towards partial fulfilment of the requirements of the **Master of Occupational Therapy (Advanced OT in Neurology)** of the Tamil Nadu Dr.M.G.R. Medical University, Chennai.

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# A Cross Sectional Study To Relate The Stages Of Parkinson's Disease With Cognitive Deficits, Activities of Daily Living and Balance Confidence .

## ABSTRACT

**Background:**

Dementia is often associated with Parkinson disease (PD), especially in the late stages. Cognitive
impairment of a lesser severity is also common in patients with PD without dementia, designated as mild cognitive impairment (MCI) of PD, or PD-MCI. PD has a profound impact on a person's ability to carry out self care and balance confidence during activities of daily living resulting in increased dependence.

**Aim:**

Thus this study aimed to compare and investigate the relation between stages of PD and cognitive deficits, activities of daily living and activities specific balance confidence.

**Method:**

A cross sectional survey design was adopted to find out the relation between stages of Parkinson's Disease and Cognitive deficits, Activities of daily living and balance confidence . A convenient sampling was adopted for the study. The 82 individuals with Parkinson's Disease at 0-5 stage of Hoehn &Yahr and age ranging from 60 years and above were included. Survey was done to find the relation between Hoehn and Yahr stages and Cognition , ADl and Balance confidence. The scales administered were MOCA(Montreal Cognitive Assessment Scale), Modified Barthel Index Scale, ABC(Activities specific Balance Confidence Scale).

**Results**:

Findings revealed a total of **63.4%(n=52) and35.4%(n= 29)** of the participants were classified as having dementia & mild cognitive impairment respectively . Among these individuals with Parkinson's Disease **22% &13%** of them showed cognitive dysfunction at

**H&Y 1.5,2** stage. Most of the patients were (n=11) moderately dependent in daily living skills and at 1.5 Hoehn &Yahr stage. Overall 96.3% (N=79) of the participants had a low balance confidence at 1.5 Hoehn &Yahr stage. There was a strong association between stages of Hoehn and Yahr and ADL( $p$= 0.000 ) rather than with cognition and balance confidence scale .

There was a weak negative correlation (r=-0.179) in, a moderate negative correlation (r=-0.679), and a weak positive correlation (r=.262) between Hoehn and Yahr stages and cognitive deficit, ADL index and balance confidence respectively.

## Conclusion

The results shows that as stages (H&Y) of PD progress the cognitive deficits , ADL dependence and low balance confidence increase.


## Key Words

Parkinson's Disease, Balance Confidence , Activities of Daily Living Skills, , Cognition, Mild Cognitive Impairment , PD Dementia.

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**Illustrations:**

Table 1- Frequency of MOCA score, Barthel index and ABC scale in relation to H&Y stages .

| MOCA | H&Y STAGES | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 1.5 | 2 | 2.5 | 3 | 4 | 5 | |
| 1(< 21) | 5 | 4 | 13 | 8 | 3 | 7 | 9 | 3 | 52 |
| 2(21-26) | 3 | 4 | 9 | 5 | 1 | 4 | 3 | 0 | 29 |
| 3(>26) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| total | 8 | 9 | 22 | 13 | 4 | 11 | 12 | 3 | 82 |

| BARTHEL | H&Y Stages | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 1.5 | 2 | 2.5 | 3 | 4 | 5 | |
| 1(0-20) | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 3 | 6 |
| 2(21-60) | 1 | 0 | 0 | 0 | 2 | 4 | 9 | 0 | 16 |
| 3(61-90) | 0 | 2 | 11 | 8 | 2 | 4 | 1 | 0 | 28 |
| 4(91-99) | 1 | 4 | 4 | 3 | 0 | 2 | 1 | 0 | 15 |
| 5(100) | 6 | 3 | 6 | 2 | 0 | 0 | 0 | 0 | 17 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| total | 8 | 9 | 22 | 13 | 4 | 11 | 12 | 3 | 82 |

| ABC | H&Y STAGES | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 1.5 | 2 | 2.5 | 3 | 4 | 5 | |
| 1(>75.6) | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 2(<75.6) | 7 | 7 | 22 | 13 | 4 | 11 | 12 | 3 | 79 |
| total | 8 | 9 | 22 | 13 | 4 | 11 | 12 | 3 | 82 |

Table 2. Shows association between the Stages of PD and Cognition , ADL and Balance confidence

| Group | variable | frequency | percentage | P value |
|---|---|---|---|---|
| H&Y-BARTHEL | 1 | 6 | 7.3 | 0.000 |
| | 2 | 16 | 19.5 | |
| | 3 | 28 | 34.1 | |
| | 4 | 15 | 18.3 | |
| | 5 | 17 | 20.7 | |
| H&Y-MOCA | 1 | 52 | 63.4 | 0.633 |
| | 2 | 29 | 35.4 | |
| | 3 | 1 | 1.2 | |
| H&Y-ABC | 1 | 3 | 3.7 | .071 |
| | 2 | 79 | 96.3 | |

## ABBREVIATIONS

| | | |
|---|---|---|
| MoCA | - | Montreal cognitive Assessment Scale |
| MBI | – | Modified Barthel Index. |
| ABC Scale | – | Activity Specific Balance Confidence scale. |
| H&Y stage | - | Hoehn and Yahr |
| PD | – | Parkinson's disease |
| PDD | – | Parkinson's Disease Dementia. |
| MCI | – | Mild cognitive Impairment |
| PD-MCI | – | Parkinson's Disease - Mild Cognitive Impairment. |
| ADL | - | Activities of Daily Living |

## OPERATIONAL DEFINITIONS

Parkinson's Disease – is a progressive neurodegenerative disorder typically characterized by motor symptoms including Tremor, Rigidity, Bradykinesia & Postural Instability & gait dysfunction

| | | |
|---|---|---|
| PD Dementia | – | was based on MoCA scale score of <21 |
| Mild Cognitive Impairment | – | was based on MoCa scale score of 21-25. |
| Cognition | – | as defined by MoCA scale |
| Balance Confidence | - | as defined by ABC scale |
| Activities of Daily Living | – | Includes all the Activities that the patient performs throughout the day including Instrumental ADL and Basic ADL. |

# INTRODUCTION

Parkinson's disease is a progressive neurodegenerative disorder typically characterized by motor symptoms including tremor, rigidity, bradykinesia , & postural instability & gait dysfunction .While dementia is frequently a late feature of Parkinson's Disease, subtle cognitive dysfunction can be found early in the disease course.(Ann B. Sollinger, Felicia C. Goldstein;2010)[1]

In India, the prevalence rates of dementia over the past 2 decades ranged from approximately 1.4 % among those 65 years & older to 3.5 % among those 60 years & older in rural settings; in urban settings , the prevalence rate were reported as 2.44% among those 65 years & older. Recently, in India, the crude prevalence rates of dementia in persons aged 60 & older have been reported to be as high as 10.6% for those living in rural areas & 7.5% for those in the urban areas(Jaya Sanyal,Tapas Kumar Banerjee;2014)[2]

People with Parkinson's disease run an increased risk of falling, & most falls occur while walking or turning. Fear of falling is even more common & pronounced among fallers, & it can cause ADL restrictions & social isolation (Dennis AC, Noorigian JV: 2007)[3].The greater degree of fear of falling & its possible association with altered postural control suggests that fear of falling should be considered as an important, independent risk factor in the assessment & treatment of postural instability in patients with Parkinson's Disease. Mild cognitive impairment was a risk factor for development of dementia within 4 years ,& the results suggested that mild cognitive impairment represents the initial stage of progressive cognitive decline in Parkinson's Disease that leads to dementia(Ann B.Sollinget,felicia c; 2012)[4]

The existence of postural instability in Parkinson's disease provides a significant reason to investigate the relationship between fear of falling and postural control in this population. Alterations in postural control strategies observed in Parkinson's disease are presumed to result from an underlying physiological cause associated with the disease process, fear of falling may also significantly contribute to these changes.(Allan L.Adkin,James S Frank;2003)[5]

While dementia is frequently a late feature of Parkinson's disease, subtle cognitive dysfunction can be found early in the disease course. Cognitive impairment not reaching the level of dementia is typically characterized by executive dysfunction, and these subtle changes have been reported in approximately 30% of non-demented Parkinson's disease patients. While some suggest that cognitive impairment may be predictive of the development of later dementia, it is unknown whether these early difficulties represent frontal and or subcortical processing changes that might be stable and part of the spectrum of dopaminergic dysfunction or whether they are the prodrome of a progressive dementing syndrome. This is an important question to answer as could lead to prediction and prevention of dementia in Parkinson's disease.(Ann B Sollinger, Felicia C Goldstein;2010)[2]

There is a high occurrence of falls in Parkinson's disease (40%-70%), which occur during daily activities and when patients are optimally medicated. Falls lead to injuries, fear of falling, reduced mobility and a concomitant development of weakness, deterioration of fitness, loss of independence, increased risk of nursing home admission, and reduced survival. These impacts upon the health care system and the broader community. Consequently ,there is a need to identify falls risk predictors relevant to Parkinson's disease as this is critical for prescribing appropriate treatments and interventions.(G.K.Kerr,C.J.Worringham;2010)[6]

Identification of initial impact or mild cognitive impairment in Parkinson's disease is important, because it predicts future cognitive decline, including development of Parkinson's disease dementia, and deterioration of health-related quality of life. Impairments in executive function, attention, visuospatial skills, and memory characterize the typical cognitive profile in Parkinson's disease, whereas language and praxis are thought to be relatively spared. The memory impairment associated with Parkinson's disease is classically considered a retrieval deficit as opposed to an encoding deficit. There is substantial overlap in the pattern of observed cognitive deficits in Parkinson's disease without dementia and Parkinson's disease dementia. (Sarra Nazem,BA, Andrew D Siderowf;2009)[7]

Parkinson's disease is characterized by various motor symptoms including bradykinesia, rigidity, and tremors and treatment is primarily aimed at improving motor function. Although medical treatment can greatly improve overall functioning

in early Parkinson's disease ,pharmacological treatment encounters difficulties in the advanced stage such as drug complication and low compliance ,which may be related to motor disability ,depression ,or dementia.(Ji Seon Kim,Jong Kim;2013)[8] .The clinical management of Parkinson's disease consists predominantly of pharmacological therapy. However, even with optimal medical treatment in place, disability can still persist and progress.

Parkinson's disease dementia is characterized by cognitive deterioration affecting daily life. However, activities of daily living dysfunction in Parkinson's disease can result from different causes including motor, cognitive, or autonomic deficits. As a result impaired activities of daily living abilities have been detected even at early stages of the disease when the prevalence of Parkinson's disease dementia is rather low. Parkinson's disease –Mild cognitive impairment is a significant, independent factor contributing to poorer quality of life in patients with newly diagnosed Parkinson's Disease.

In particular Parkinson's disease has a profound impact on a person's ability to carry out selfcare and activities of daily living, resulting in increased dependence. In order to manage patients effectively, occupational therapists often synthesise knowledge from a wide range of sources and disciplines. (Charmaine Meek , Eric Morgan;2016)[9]

Persons with Parkinson's disease present with motor and non motor symptoms. Restoring patient confidence in their ability to perform ADL could be essential to avoid the negative consequences of activity restriction & reduced quality of life(Allan L. Adkin , James S Frank:2013). Clinical assessment of daily functioning & cognition is integral to clinical decision making. Many studies have reported PD individual's have cognitive impairment, fall risks and activities restriction in daily living skills in early stages.There are few studies relating the stages of parkinson's disease with motor and nonmotor symptoms(Fuzhong LI,Peter Harmer,2012;Wei-Ju Lee,Yung Yee Chang,2013)

Hence the need of the study was to find out relation between Parkinson's Disease stages and cognitive deficits, falls and activities of daily living

## RESEARCH QUESTIONS

- Are Cognitive deficits, falls and Activities of daily living skills more prevalent at a particular stage of Parkinson's Disease.
- Is there a relation and association between stages of Parkinson's Disease with cognitive deficits, falls and activities of daily living skills.
- Is there a gender difference in prevalence of cognitive dysfunction, falls, activities of living in Parkinson's Disease.

# AIMS AND OBJECTIVES

## Aim

To compare and find out relation between Parkinson's disease stages and cognitive deficits , falls and activities of daily living skills .

## Objectives

- To find out the relationship between the stages of Parkinson's Disease with Cognitive deficits, Falls and Activities of daily living skills
- To find out the relation and association between stages of Parkinson's Disease with cognitive deficits, falls and activities of daily living skills.
- To find the gender difference in prevalence of cognitive dysfunction, falls, activities of living in Parkinson's Disease.

# REVIEW OF LITERATURE

## Epedemiology of Parkinson's disease

1. *Dementia and cognitive impairment in patients with Parkinson's disease from India ; A 7 year prospective study(Jaya Sanyal,Tapas Kumar Banerjee;2014)*

In India ,the prevalence rates of dementia over the past 2 decades ranged from approximately 1.4% among those 65 years and older to 3.5 % among those 60 years and older in rural settings;in urban settings, the prevalence rates were reported as 2.44% among those 65 years older. Recently ,in India ,the crude prevalence rates of dementia in person aged 65 and older have been reported to be as high as 10.6% for those living in rural areas and 7.5% for those in the urban areas. Patients with early – onset PD might be more prone to complex depression and dementia . As the disease progresses , akinetic domain PD, early hallucinations, and asymmetrical disease onset are the potential risk factors for the development of dementia in patients with PD.

2. *Research in Parkinson's disease in India; A review(Pratibha Srathi, Ketan Jhunjhunwala;2016)*

This review shows that there is paucity of literature about PD in India. There are very few centers which are doing research in this field. This review shows that the Indian population may differ from the test of the world in the context of PD , be it epidemiology or genetic or response to treatment. The social and psychological issues in our patients are also different. Patients with PD , because of their disability ,can have poor quality of life –physical , psychological, and social. The quality of life was found to influenced by disease stage, severity, duration, and financial security. Indian had lesser disturbances in family and communal relationship due to disease, probably due to stronger family bonds in their families.

3. *A study on risk factors for parkinson's disease in Indian poplation(Vineeta Gupta,Ravindra Kumar;2014)*

Parkinson's disease is the second most common neuro degenerative disorder after Alzheimer's disease which after 1-2 % of the population above age 65 and 4-5 % above age 85 with a higher prevalence in men. To find out the association between environmental factors and risk of Parkinson's disease ,a case control study was

designed. Results from the present study showed that gender, religion, education, place of living , occupation, dietary habits, tobacco chewing ,smoking, alcohol intake , and head injury had no association with PD. However, chemical exposure and well water drinking were significantly associated with PD, which concluded that environmental factors could act as a risk factor for PD in some way

4. *Epidemiology and treatment of Parkinson's disease in India (Bhim Singhal, Jimmy Lalkala;2003)*

Parkinson's disease has a low prevalence in India except in the small Paris community where Bharucha found a high prevalence. Although early onset PD and familial cases have been described from India, no genetic mutations have as yet been identified. PD has been known in India is similar to that in the other countries. Unfortunately, lack of awareness, limitation of human resources and cost factors deny the benefits of therapy to many patients.

**Falls in Parkinson's Disease**

5. *Assessment of fall –related self – efficacy and activity avoidance in people with Parkinson's disease(Maria H Nilsson.Anna-Maria Darke;2010)*

Fear of falling is common in Parkinson's disease, & it is considered a vital aspect of comprehensive balance assessment in Parkinson's disease. Experiencing falls, unsteadiness while turning & fear of falling was associated with lower fall related self- efficacy & higher activity avoidance. In this study 79 people with Parkinson's Disease were taken for balance assessment. This study suggests an impact not only on activity performance but also on participation. The present results furthermore show that people with Parkinson's Disease who were unsteady, had experienced previous falls and or reported a fear of falling avoided more activities due to the risk of falling.

6. *Diagnosis of fall risk in Parkinson disease: an analysis of individual & collective clinical balance test interpretation(Leland E Dibble,Jesse Christensen;2015)*

Parkinson's Disease results in an increased frequency of falls relative to the frequency in neurologically healthy individual. 70 people with Parkinson's Disease

participated in this study.36 participants reported a fall history . Fall related injuries appear to be more common in people with Parkinson's Disease ,with fractures being of particular concern . It is necessary to accurate identification of fall risk is important so that people at risk and their caregivers are aware of the risk for injury. Additional research should be performed to add to the few studies that have directly examined the effects of rehabilitation interventions on fall risk & fall occurrence.

7. *Predictors of future falls in Parkinson's disease(G.K.Kerr, C.J.Worringham;2010)*

There is a high occurrence of falls in Parkinson's Disease , which occur during daily activities & when patients are optimally medicated. Despite the severe consequences, falls ,a major unresolved issue is the identification of factors that predict the risk of falls in individuals patients with Parkinson's Disease. Fall are a significant problem in optimally medicated early-stage Parkinson's Disease. A combination of both disease –specific & balance & mobility –related measures can accurately predict falls in individuals with Parkinson's Disease.

8. *Fear of falling and postural control in Parkinson's disease(Allan L Adkn, James S. Frank;2003)*

This study investigated the relationship between fear of falling & qualitative & quantitative postural control in Parkinson's disease. Fifty eight nondemented Parkinson's Disease patients were studied along with age matched healthy controls. Fear of falling may act to promote greater caution in Parkinson's Disease patients providing a successful compensatory strategy to avoid potential falls in challenging situations. The greater degree of fear of falling & its possible association with altered postural control suggests that fear of falling should be considered as an important, independent risk factor in the assessment & treatment of postural instability in patients with Parkinson's Disease.

9. *Recurrent falls in Parkinson's disease: a systematic review(Natalie E Allen, Allison k Schwarzel;2013)*

Falls are a debilitating & costly problem for many people with Parkinson's Disease, with people with Parkinson's Disease twice as likely to fall as people with other neurological conditions. Factors associated with recurrent falls include ,positive

fall history, increased disease severity and duration ,increased motor impairment, treatment with dopamine agonists, increased Levodopa dosage, cognitive impairment fear of falling, freezing gait, impaired mobility and reduced physical activity. There are several factors particularly associated with recurrent falls ,fall management and prevention strategies specially targeting recurrent fallers require urgent evaluation in order to inform clinical practice. Cognitive behavioral therapy used in conjunction with physical training has been shown to be effective in decreasing fear of falling in the general older population but has not been investigated in the Parkinson's Disease population.

10. *Incidence and prediction of falls in Parkinson's Disease: a prospective multidisciplinary study(B H Wood,J A Bilclough,A Bowron;2002)*

Falls are a common problem in Parkinson's Disease. The association between duration and severity of disease and falling is also important. Previous falls, disease duration, dementia, and loss of arm swing are independent predictors of the risk of falling in the Parkinson's patients. Dyskinesia, bradykinesia, and wearing off phenomena may be particularly important for falls risk. Falls occurred in 63.8% of subjects. There were also significant associations between disease severity, balance impairment, depression, and falling. Falls are a common problem in PD and some of the major risk factors are potentially modifiable. There is a need for future studies to look at interventions to prevent falls in PD.

**Cognition in Parkinson's Disease**

11. *Montreal cognitive assessment performance in patients with Parkinson's Disease with normal global cognition according to MMSE score(Sarra Nazem, BA,Andrew D Siderowf;2009)*

Identification of initial impact or MCI in Parkinson's Disease is important, because it predicts future cognitive decline, including development of Parkinson's Disease dementia & deterioration of health related quality of life. There is substantial overlap in the pattern of observed cognitive deficits in PD without Parkinson's disease dementia. Recognition of cognitive impairment at its initial stage will enable clinician to educate patients & family members about prognosis & to allow informed decision about the risks & therapeutic intervention. Therefore, beginning at time of initial

diagnosis, routine cognitive screening with a sensitive instrument ,such as the MOCA, may aid in the comprehensive management of all patients with Parkinson's Disease. MCI almost always precedes the onset of dementia, the cumulative prevalence of MCI at point during the course of PD is at least as high.

12. *Mild cognitive impairment in Parkinson's disease: subtypes & motor characteristics (Ann B Sollinger,Felicia C.Goldstein: 2010)*

The aim of this project were to determine the risk factors for & clinical characteristics of mild cognitive impairment in Parkinson's disease. The MCI group had longer duration of disease & higher postural instability & gait disorders subscale scores than the cognitively normal group. while dementia is frequently at late feature of PD ,subtle cognitive dysfunction can be found in early in the disease course.MCI was a risk factor for development of dementia within 4 years, and the results suggested that PD that leads to frank dementia. Future studies should focus on additional risk factors for MCI subtypes & their possible progression to dementia.

13. *Severity of mild cognitive impairment in early Parkinson's Disease contributes to poorer quality of life(Rachael A Lawson,Alison J Yarnall;2014)*

Poor quality of life is a feature of people with Parkinson's Disease who develop dementia. The relationship between mild cognitive impairment in PD and quality of life is less clear. In this study newly diagnosed PD and age and sex matched healthy controls were taken. PD –MCI is a significant, independent factor contributing to poorer quality of life in patients with newly diagnosed PD. Increased awareness and understanding of the impact of PD –MCI would inform clinician of which cognition focused interventions, such as cognitive training or cognitive stimulation interventions are potentially beneficial. Targeting specific cognitive impairment to improve everyday function, ADL and coping strategies may also have a direct positive impact on quality of life.

14. *Parkinson's disease Dementia can be easily detected in routine clinical practice(Kathy Duardin,Burno Dubois;2010)*

Parkinson's disease is mainly characterized by its motor characteristics, but it is also frequently associated with dementia. Early diagnosis of Parkinson's Disease Dementia is particularly important because effective cholinesterase inhibitor

treatments are available. This study aimed at validating a short procedure for screening for PDD practice and which adopts recently published diagnostic criteria. The examination procedure comprised 3 steps: standard clinical examination, a short cognitive function assessment fulfilling the requirements of the Movement disorder society examination, five –word test, word generation task, and impact on daily life, including a questionnaire on compliance and an extensive evaluation of cognitive functions and behavior. With an easy to use, short battery of test that are commonly used in routine clinical practice, it is possible to diagnosis PDD in accordance with reference criteria and with the same sensitivity and specificity as in a more extensive evaluation.

15. *Diagnosis procedure for Parkinson's Disease dementia; Recommendations from the Movement disorder society task force(Bruno Dubois,David Burn;2007)*

A preceding article described the clinical features of Parkinson's Disease Dementia(PDD)&proposed clinical diagnostic criteria for 'probable',&'possibl' Parkinson's Disease Dementia. The main focus of the article is to opertionalize the diagnosis of Parkinson's Disease –Dementia &to propose practical guidelines based on a 2 level process depending upon the clinical scenario & the expertise of evaluator involved assessment. Given the lack of evidence based standards for some tests when applied in this clinical context, we have tired to make practical &unambiguous recommendations, based upon the available literatrure & the collective experience of the task force. We accept, however that further validation of certain test & modification in the recommended cutoff values will be required through future studies

16. *Subtypes of mild cognitive impairment in Parkinson's Disease;progression to dementia(Carmen Cristea Janvin;2006)*

The aim of this study was estabilish the rate of progression from mild cognitive impairment (MCI) to dementia in patients with Parkinson's Disease (PD). Parkinson's Disease patients without dementia were recruited in 1997 from an ongoing prospective epidemiological study. We conclude that patients with Parkinson's Disease and Mild Cognitive Impairment had a higher risk of developing dementia than cognitively intact Parkinson's Disease patients, suggesting that Mild Cognitive Impairment in Parkinson's Disease is an early manifestation of dementia.

However, these findings should be interpreted with caution due to the relatively small number of subjects included in this study.

**Studies related to ABC scale**

17. *Assessing fear of falling : can a short version of the activities –specific balance confidence scale be useful(Chava Perrtz, Talia Herman,Jeffrey M.Hausdorff;2006)*

Fear of falling (FOF) is a disabling phenomenon common among patients with postural instability and gait disturbances, such as Parkinson's Disease and older adults with higher level gait disorders. This study reported on loss of balance confidence and FOF in patients with advanced PD to our knowledge, this is one of the few investigations to use the ABC-16 in patients with movement disorder. The ABC is useful for assessing fear of falling in PD patients. This tool will have utility in the evaluation, management, and care of patients in every day, busy clinical practice and in research settings.

18. *Psychological indicators of balance confidence: relationship to actual and perceived abilities( Anita M.yers, Lynda E Powell;2009)*

Falls their prediction, and prevention have been examined using physical parameters, most notably measures of balancing ability. The greater attention paid to physical indicators than to psychological factors must be reexamined, particularly given that balance test performance appears to be affected by subject apprehension. Psychological indicators of balance confidence are important to measure both in conjunction with balance test performance and as a legitimate focus of rehabilitation. Of the various indicators assessed here , the dichotomous fear of falling question appears to have the least utility .Perceived need for personal assistance to ambulate outdoors has merit as an initial clinical screening question for discriminating persons on the basis of both physical ability and confidence. The ABC scale appears to have the greatest utility as an evaluative index for older persons at a moderate to high level of functioning.

19. *Effect of balance training on postural instability in patients with idiopathic Parkinson's Disease(Nicola Smania,Elisabetta Corato,Michele;2010)*

Postural instability is a common feature of Parkinson's Disease, becoming a clinical concern in the middle stage of the progressive illness. A total of 64 patients suffering from idiopathic PD and postural instability (H&Y stage 3-4) were recruited from 130 patients in outpatient ward. 8 week intervention given to PD patients. Patients with PD received a rehabilitation program based on movement strategy, fall prevention, regular physical activity and aerobic strength. The result shows proper balance training in patients suffering from PD can improve performance in highly relevant outcomes related to better postural control.

**Studies related to ADL skills**

20. *Non-motor symptoms in portuguese Parkinson's disease patients: correlation & impact on quality of life & activities of daily living (Paulo Bugalho,Tania Lampreia;2016)*

In this study focused on the impact of motor & non motor symptoms on health related quality of life & activities of daily living. It mainly focused on the correlation between motor & non motor symptoms. Non motor symptoms exert a stronger influence than motor symptoms in health related quality of life, which should be taken in account regarding treatment options. Non motor symptoms could contribute to the incapacity and influence health related quality of life.

21. *Use of the Pill Questionnaire to detect cognitive deficits & assess their impact on daily life in patients with Parkinson's disease (Ji Seon Kim,Jong – Min K im;2013)*

Parkinson's Disease is manifested in various combinations of motor symptoms that are associated with impairment s in basic ADLs. Patients who did not manage their medications independently demonstrated greater cognitive impairment & more severe motor symptoms. Additionally, decline in cognitive functioning is central to the diagnosis of Parkinson's disease dementia and must be severe enough to impair the ability to negotiate daily life basic clinical assessment of daily functioning & cognition is integral to clinical decision- making in inpatient & outpatient settings.

22. *How precise are activities of daily living scales for the diagnosis of Parkinson's disease dementia – a pilot study(Josephine B M Chirst, Monika Fruhmann;2013)*

Parkinson's disease dementia is characterized by cognitive deterioration affecting daily life. Activities of daily living dysfunction in Parkinson's disease can result from different causes including motor, cognitive , or autonomic deficits. As a result , impaired ADL abilities have been detected even early stages of the disease when the prevalence of Parkinson's disease dementia is rather low. Reduced attention has been shown to be the strongest predictor for ADL dysfunction in PD arguing for the clinical relevance of cognitive aspects for ADL function .

23. *Activities of daily living questionnaire from patient's perspectives in Parkinson's disease; a cross sectional study (Su Yun Lee, Sung Kwan Kim;2016)*

Parkinson's disease people are at increased risk for decreased activities of daily living with progression of the disease ,particularly those requiring coordination and balance. The treatment goal for the patients with Parkinson's disease is to focus on symptoms and improve ADL. Therefore, it is mandatory to assess the ADL of patients with PD, which is essential for evaluating the effectiveness of symptomatic and potentially disease modifying treatments.

# RELATED LITERATURE

When the term Parkinson's disease is used, there is a tendency to visualize a disabled individual with typical flexed posture, immobile features, and tremor that is most pronounced in the hands. A person with Parkinson's disease can also appear completely normal and demonstrate no disability, as is the case in the early stages of the disorder or while the disease is controlled by medications.

The most important side effects of drug therapy for Parkinson's disease in the frail and cognitively impaired elderly are related to cognitive dysfunction. Increasing cognitive impairment may occur, which implies that such patients need to be carefully monitored, with repeated assessment of their cognitive state.

People with Parkinson's disease run an increased risk of falling, and most occur while walking or turning. Some factors associated with an increased risk of falling are longer Parkinson's disease duration, limitations in activities of daily living and more severe motor symptoms. Fear of falling and increased fall risk in people with Parkinson's disease. Fear of falling and decreased balance confidence is more common in people with Parkinson's disease than in healthy controls.

Fear of falling has been shown to be a significant predictor of future falls. It has therefore been recommended to include fear of falling when assessing balance performance in persons with Parkinson's disease. Fear of falling reduced mobility and a concomitant development of weakness, deterioration of fitness, loss of independence, and increased risk of home admission. and reduced survival. This impacts upon the health care system and other broader community. Consequently, there is a need to identify fall risk predictors relevant to Parkinson's disease as this is critical for prescribing appropriate treatments and interventions.

Cognitive impairment is a well known symptom of Parkinson's disease, predominantly in elderly patients in later stages of the illness. Cognitive decline is a predictor of dementia in Parkinson's disease, and has important consequences for patient management. Dementia is a recognized sequela of Parkinson's disease, and its diagnostic criteria have been outlined, but the cognitive phenotype is less clear. Studies show that patients with Parkinson's disease having mild cognitive impairment are clinically characterized as intermediary between normal cognition and dementia.

However, controversies persists in the relationship between compromised cognition and motor aspects, age of onset of disease, and type of evolution.

Parkinson's disease dementia is characterized by cognitive deterioration affecting daily life. However, activities of daily living dysfunction in Parkinson's disease can result from different causes including motor, cognitive, or autonomic deficits. As a result, impaired activities of daily living abilities have been detected even at early stages of the disease when the prevalence of Parkinson's disease dementia is rather low. Activities of daily living dysfunction associated with Parkinson's disease dementia should be caused by cognitive worsening but should not primarily reflect motor impairment. Activities of daily living inventories are known to atleast partly reflect motor disabilities. Since Parkinson's disease dementia patients should be treated as early as possible, it is important to know whether activities of daily living inventories are helpful to diagnose Parkinson's disease dementia.

The high prevalence of mild cognitive impairment in Parkinson's disease and its association with future development of dementia, it is important that patients with Parkinson's disease, even those with mild disease, be screened regularly for cognitive impairment. An ideal cognitive screening instrument in Parkinson's disease should be brief, assess a range of cognitive domains, simple to administer, sensitive to the initial stage of cognitive impairment, and affected by motor impairment

The impact of disease on activities of daily living as reported by patients themselves is an important measure of the disadvantage attributable to any disease state. The degree to which a disease interferes with the ability to carry on a normal life is likely to be more important to the patient than formal measures of disease severity. Self report measures of functional status can also be used to monitor and in the evaluation of novel therapies. Parkinson's disease is a progressive neurological illness with a strong age-associated risk. A number of observed –rated scales have been developed to evaluated the clinical severity in Parkinson's disease, such as Hoehn and Yahr (H& Y),Webster and Columbia University Rating Scale.

The clinical management of Parkinson's disease consists predominantly of pharmacological therapy. However, even with optimal medical treatment in place, disability can still persists and progress. In particular, Parkinson's disease has profound impact on a person's ability to carry out self care and activities of daily

living resulting in increased dependence. For this reason, non- pharmacological treatments, such as occupational therapy, are often employed as an adjunct to traditional medical management. The inclusions of occupational therapy management of Parkinson's disease is supported by anecdotal evidence from patients and health care professional.

**Occupational therapy point of view**

Maintaining or optimizing meaningful occupational performance (in living/caring, work and leisure)of the patient and or caregiver in his living and working environment

Potential basis for change

- the patient
- the activity
- the physical environment
- the caregiver/social environment

A combination of focal points, interventions and strategies is usually required in achieving an interventional goal

**Early occupational therapy intervention**:

Occupational therapy aims towards establishing rapport , preventing changes in roles and participation in environment. It may help to prevent some functional problems before they arise. Also, we may use occupational therapy targeted towards the restoration of underlying impairment, be it motor or nonmotor, this is most relevant for the early stages of Parkinson's disease

**Occupational therapy at advanced stage Parkinson's disease:**

As the disease progresses ,some changes are required in overall lifestyle .it is important to organize daily routine in such a way as to encourage independence, safety and confidence in as many areas of daily life for as long as possible. In the intermediate (maintenance and complex) and later (palliative) stage, it is important to consider wearing – off problems, on-off fluctuations, dyskinesias, falls and freezing.

Relatives become important members of the rehabilitation team, this is when the adaptive and compensatory approaches become relavant. These will include introducing equipment aids and environmental adaptations , such as provision of hoists, adapting bathroom facilities, installation of a stair-lift ,adapting the kitchen, supply of handwriting devices, adaptation of clothing and so on. Patients and therapist may focus on methods that will help patients to perform meaningful occupations independently and with satisfaction according to the patient's residual abilities, and also by using attentional strategies, visual and auditory cues and multitask training.

Patients with Parkinson's disease have difficulty performing their activities of daily living because of the brain's deficit in maintaining the size and correct timing of movements. There are also problems in the formulation and maintenance of cognitive sequences, leading to impaired ability with executive, frontal type functioning. The patient can be taught movement and cognitive strategies that utilize conscious attention and avoid multitasking. For ex, dressing is made easier by planning the activity sequence in advance ,gathering and organizing the garments and sitting down to dress.

Occupational therapist should effectively provide ongoing support and treatments for the patient with Parkinson's disease in order to help to sustain and or regain physical , mental and social well- being. This is more effective when having an opportunity to work within a multidisciplinary movement disorder team.

# METHODOLOGY

**Research Design:**

A cross sectional survey study design was adopted to find out the relation between stages of Parkinson's disease and cognitive impairment, activities of daily living and balance confidence in daily activities.

**Setting of the Study:**

The study was conducted at KMCH a tertiary hospital in Coimbatore city

**Ethics Issues:**

The Study was approved by the KMCH Institutional review board. Formal consent was obtained from the Neurologist at KMCH for referring the participants for the study.

**Variables:**

Independent variable- Parkinson's disease stages (H&Y)

Dependent variable- Cognition, Activities of daily living and Balance confidence

**Sampling Technique:**

Convenient sampling was used for the study.

**Statistical determination of the sample size**

Sample size estimation for descriptive studies of categorical variables was used for the study. This was used to calculate the sample size needed to detect relevant simple correlation with specific significance level and power.

The following hypothesis was used

$H_0$ : p = 0 Versus $H_a$ : p = r ≠0. i.e. total sample size required to determine whether correlation coefficient differs from Zero.

The method of estimating the variance is to conduct a small pilot study. Based on this, 25 samples were taken for the pilot study

α (two tailed) = 0.050 Threshold probability for rejecting the null hypothesis. Type 1 error rate.

β = 0.200 Probability of falling to reject the null hypothesis under the alternate hypothesis. Type 2 error rate.

r = 0.306. The expected correlation coefficient

**Calculate:**

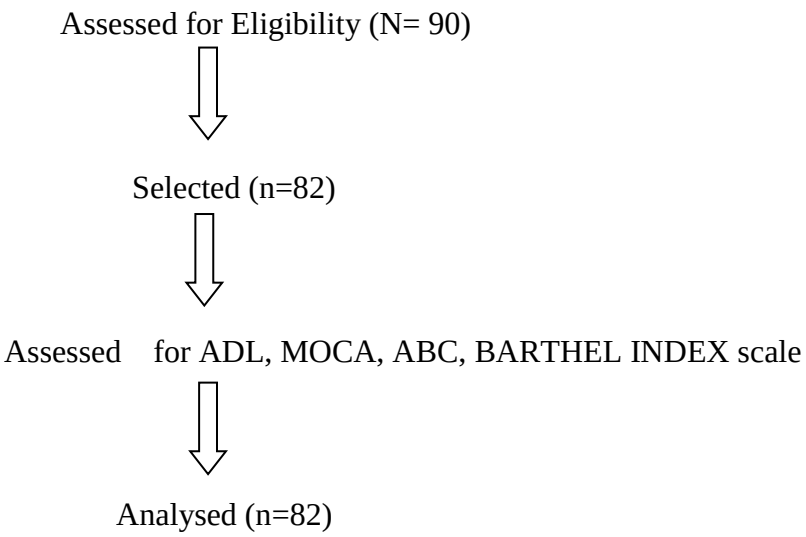
The standard normal deviate for $\alpha=Z\alpha$ =1.960

The standard normal deviate for $\beta=Z_\beta$=0.842

C=0.5* In[(1+r)/(1-r)]=0.316

Total sample size =$N=[(Z\alpha+Z_\beta)/C]2+3$=82

**Schematic representation of research design:**




**Inclusion Criteria**

- Individual with idiopathic Parkinson's disease
- Age group 60 years and above
- H&Y stages (0-5)
- Individuals with Parkinson's disease from both gender
- Minimum educational qualification of $10^{th}$ standard

**Exclusion Criteria**

Individuals diagnosed with any other neurological disorder and have undergone surgery for PD.

**Participants:**

A convenient sampling was adopted for the study. The 82 participants who fulfilled the selection criteria were taken for the study. Individuals of both gender diagnosed with idiopathic Parkinson 's disease at Hoehn and Yahr stage of 0-5, of age group between 60 and above with a mean of 1.98 ± 1.27 were included in the study. Person's with any other neurological disorder and who had undergone surgery for Parkinson's Disease were excluded from the study.

**TOOLS USED**

**Modified Hoehn And Yahr Scale**

It is used to assess the severity of the Parkinson's disease. It has 8 stages. The scale ranges from 0 to 5. 0-refers to absence of motor disabilities.5- indicates bedridden or wheel chair-dependent motor behavior. Hoehn and Yahr (H&Y), Webster and the Columbia University Rating scale. Self reporting of disability in PD employing these type of scale has been found to be more reliable indicator of disability.

**Montreal Cognitive assessment Scale**

The MoCA was developed as brief screening instrument for MCI and mild Alzheimers disease to address limitations of MMSE as The MoCA is divided into 7 domains of visuospatial /executive (5points), naming(3points), memory(5points for delayed recall), attention(6points), language(3points), abstraction(2points), delayed recall, orientation(6points). Age ranging from 49 – 85 years. Total score 30.26 or above is normal. Mild cognitive impairment is 21-25.Alzhemier's dementia is <21. For 4-9 years of education additional 2 points, for 10- 12 years of education additional 1 point is given. It is able to differentiate between normal and MCI and early dementia. The original validation study of the MOCA reported a sensitivity of 100% and specificity of 87% in detecting dementia. It reported a sensitivity of 90% in detecting MCI.

**Modified Barthel Index: Self Care assessment.**

It is a measure of activities of daily living, which shows the degree of independence of a patient from any assistance. It covers 10 domains of functioning activities i.e bowel control, bladder control, grooming, toilet use, feeding, transfer, feeding, walking, dressing, climbing stairs, & bathing. Each activity is scored from 0(unable to perform task) to a maximum of 5, 10, or 15 ( fully independent) .Total scores may range from 0 to 100 with higher scores indicating greater independence.

**Activities Specific Balance Confidence Scale**

It is used to provide an estimate of fear of falling. it was designed specifically to detect loss of balance confidence in individual of different functional levels, especially those individuals who may be more active. The scale includes both walking and reaching-oriented activities that challenge postural control and activities that are performed both indoor and outdoors. It is an interview assessment scale. It has greater item specificity. It includes situations or activities of daily living performed outside at home. It has 16 daily living activities rated from 0 % - no confidence to 100 % - completely confident. A score below 75.6 shows at risk for falls.

**Procedure**

Ethical clearance was obtained from the KMCH Institutional review board. The purpose of the study was explained and informed consent was obtained from the patients prior to the study. The participants were assured that all information would be kept confidential. H&Y stages was first administered to select persons with PD in the stage of 0-5. Then MOCA, ABC SCALE. BARTHEL were administered. 90 individuals with PD were selected initially. Later after sample size estimation 82 out of the 90 were included in the study.

# DATA ANALYSIS

Statistical analysis was done using SPSS 20 the collected data was carefully coded and transcribed. Using this data various tables and graphs were prepared to find out the association between variables. $p<0.05$ was considered as statistically significant.

Descriptive statistics was used to summarize demographics and disease related variables that is stage of Parkinson's Disease, Cognitive impairment, activities of daily living skills deficit and balance confidence level in the individuals with PD.

Further analysis was done by using, 2 tailed 't' test for continuous variables. Pearson's Chi squared test was used to compare categorical variables. Comparison were done using, one way ANOVA, and Spearman's rank correlation. Spearman's rank correlation coefficient is a method of finding the correlation between two variables by taking their rank. It was used to find out the relation between Parkinson's disease stages with cognitive deficits, activities of daily living skills and balance confidence. It was used as all the variables in the study followed a ranked order. A logistic regression approach was used to obtain Odd's ratios of Stages of PD associated with cognitive deficit ADL impairment and low balance confidence.

The following grouping were taken into consideration during analysis that is:

The Montreal cognitive assessment was grouped as 1,2,3 for dementia, mild cognitive impairment and normal respectively. The age was grouped as 1,2,3,4,5 for ages 60-65,66-70,71-75,76-80, above 80 respectively . Modified barthel index scale grouped as 1,2,3,4,5 for scores 0-20, 21-60,61-90,91-99,100 respectively. The activities of daily living balance confidence scale was grouped as1, 2 for scores $< 75.6$ and $> 76.5$ respectively.

# RESULTS

**Table 1- Descriptive statistics of individual with Parkinson's disease**

| Variable | number | mean±SD |
|---|---|---|
| Age | 82 | 67.56±6.72 |
| Disease Duration | 82 | 43.07±41.43 |
| MOCA score | 82 | 18.56±5.48 |
| BARTHEL score | 82 | 74.24±27.00 |
| ABC score | 82 | 47.23±18.08 |
| Hoehn and Yahr stage | 82 | - |

**Table 2- characteristics of individuals with Parkinson's disease , Age group of PD individuals**

| Variables | Group | Frequency | Percentage |
|---|---|---|---|
| Age | 1(60-65) | 42 | 51.2 |
| | 2(66-70) | 16 | 19.5 |
| | 3(71-75) | 11 | 13.4 |
| | 4(76-80) | 10 | 12.2 |
| | 5(>80) | 3 | 3.7 |

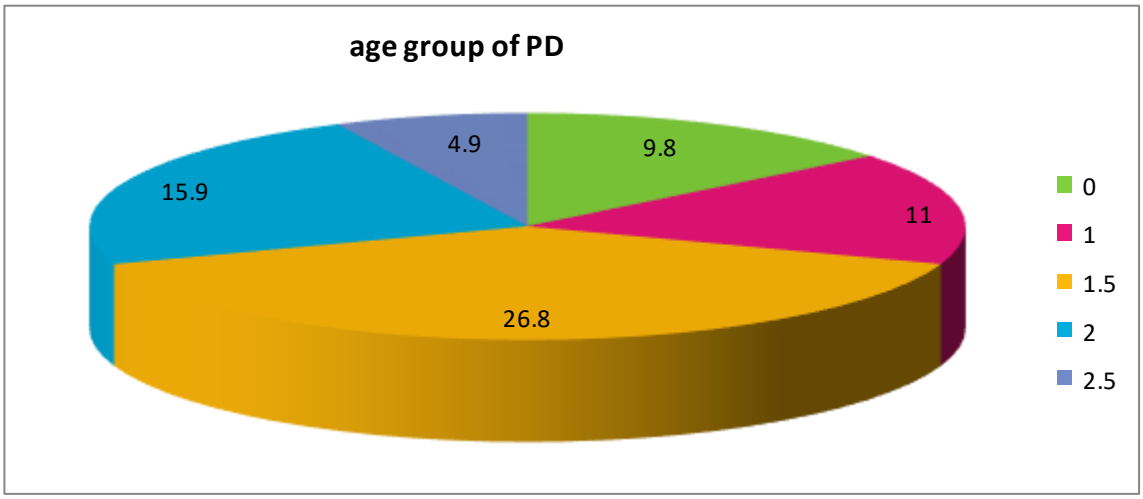


**Table 3-chracteristics of gender and ABC scale**

| Variable | Group | Frequency | Percentage |
|---|---|---|---|
| Age | 0(female) | 42 | 51.2 |
| | 1(male) | 40 | 48.8 |
| ABC scale | 1(high) | 3 | 3.7 |
| | 2(low) | 79 | 96.3 |

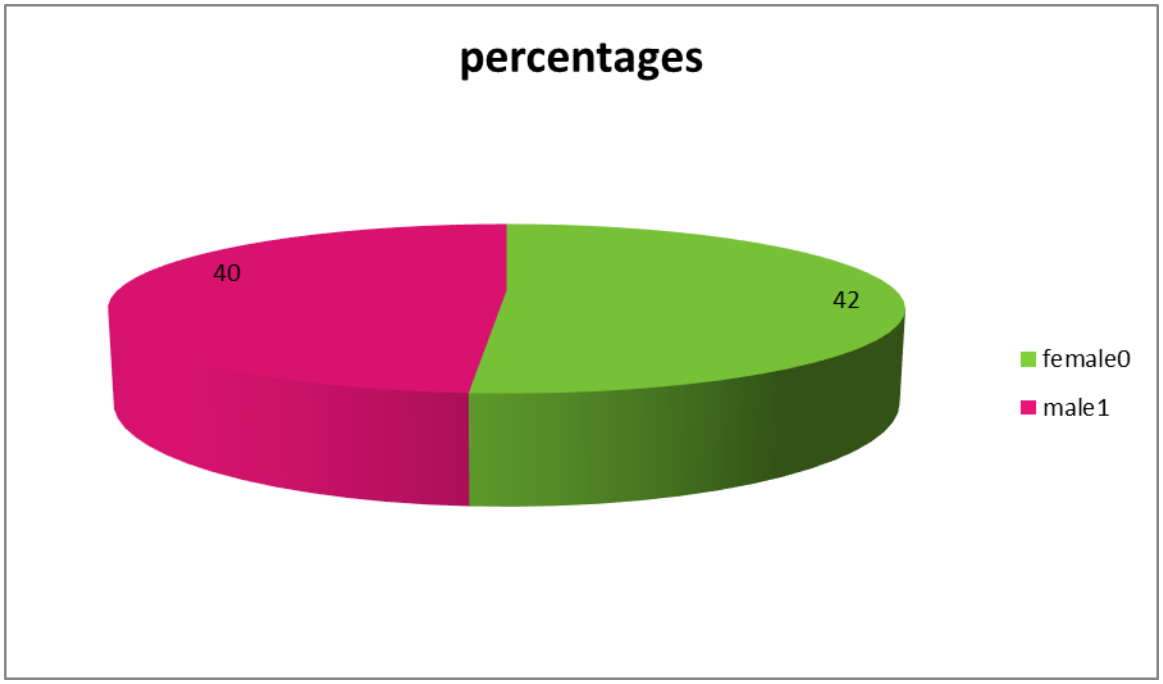


**Table 4-characteristics of occupation**

| Variable | Group | Frequency | Percentage |
|---|---|---|---|
| occupation | Farmer | 17 | 20.7 |
| | House wife | 27 | 32.9 |
| | Own business | 13 | 15.9 |
| | Retired | 18 | 22.0 |
| | Working | 7 | 8.5 |

**Table 5- characteristics of education**

| Variable | Group | Frequency | Percentage |
|---|---|---|---|
| education | SSLC | 46 | 56.1 |
| | HSC | 16 | 19.5 |
| | UG | 10 | 12.2 |
| | PG | 10 | 12.2 |

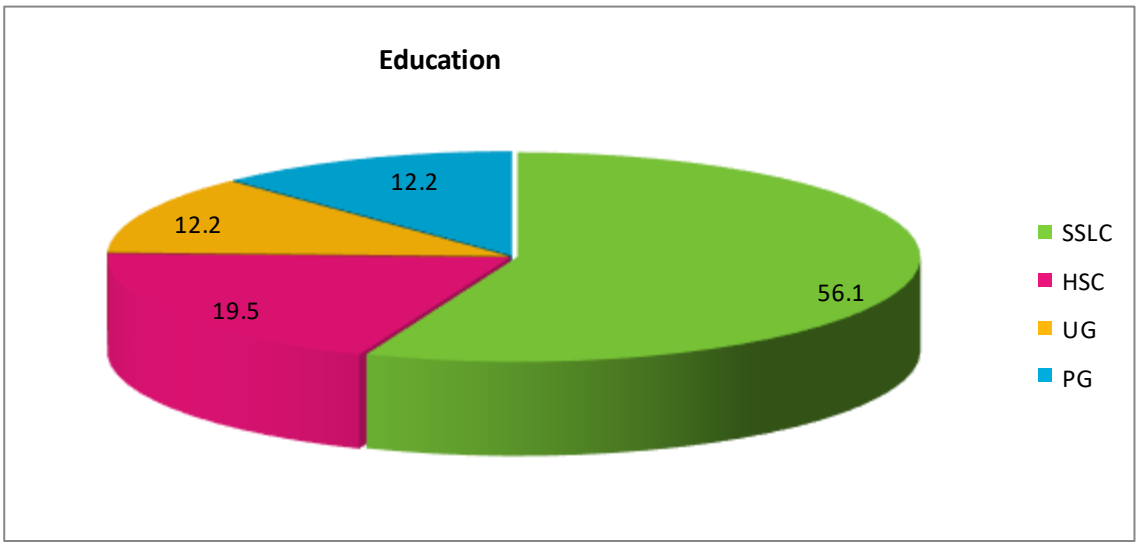


**Table 6- frequency of MOCA group**

| Variable | Stage | Frequency | Percentage |
|---|---|---|---|
| MOCA | 1 | 52 | 63.4 |
| | 2 | 29 | 35.4 |
| | 3 | 1 | 1.2 |

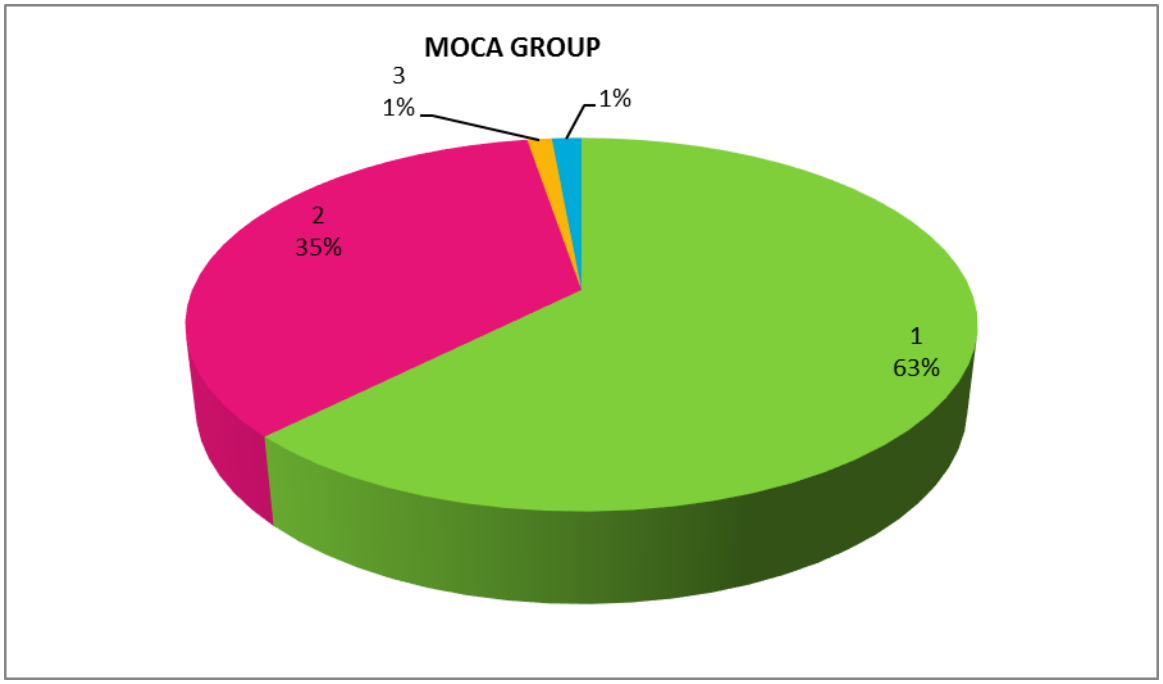


**Table 7- Frequency of H&Y stages**

| Variable | Stage | Frequency | Percentage |
|---|---|---|---|
| H&Y | 0 | 8 | 9.8 |
| | 1 | 9 | 11.0 |
| | 1.5 | 22 | 26.8 |
| | 2 | 13 | 15.9 |
| | 2.5 | 4 | 4.9 |
| | 3 | 11 | 13.4 |
| | 4 | 12 | 14.6 |
| | 5 | 3 | 3.7 |

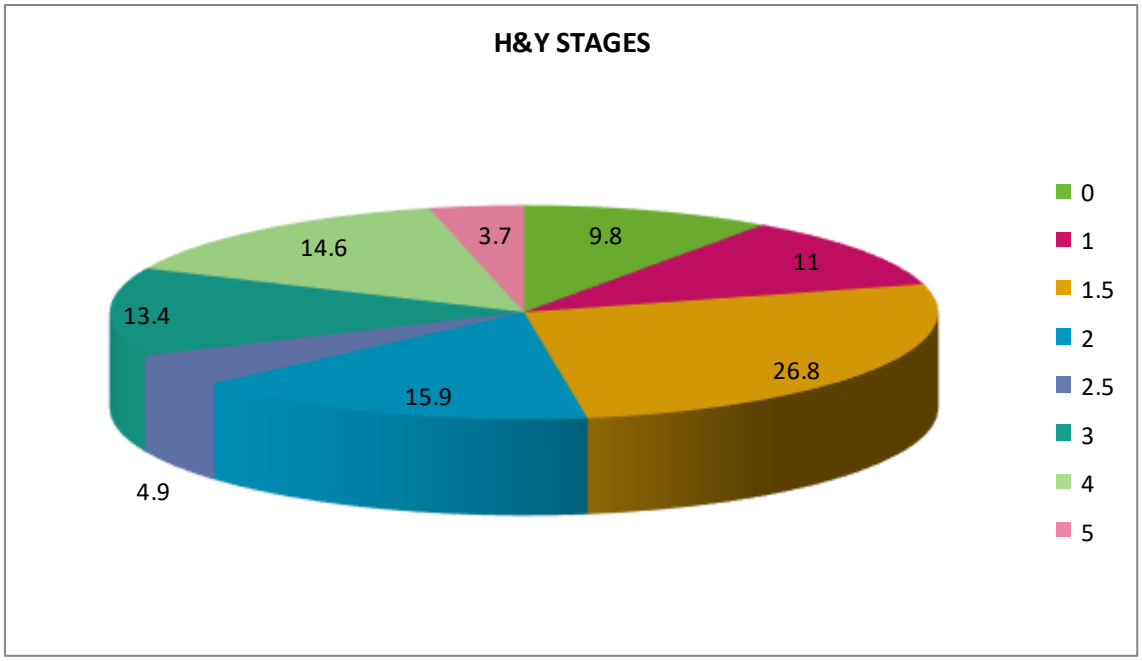
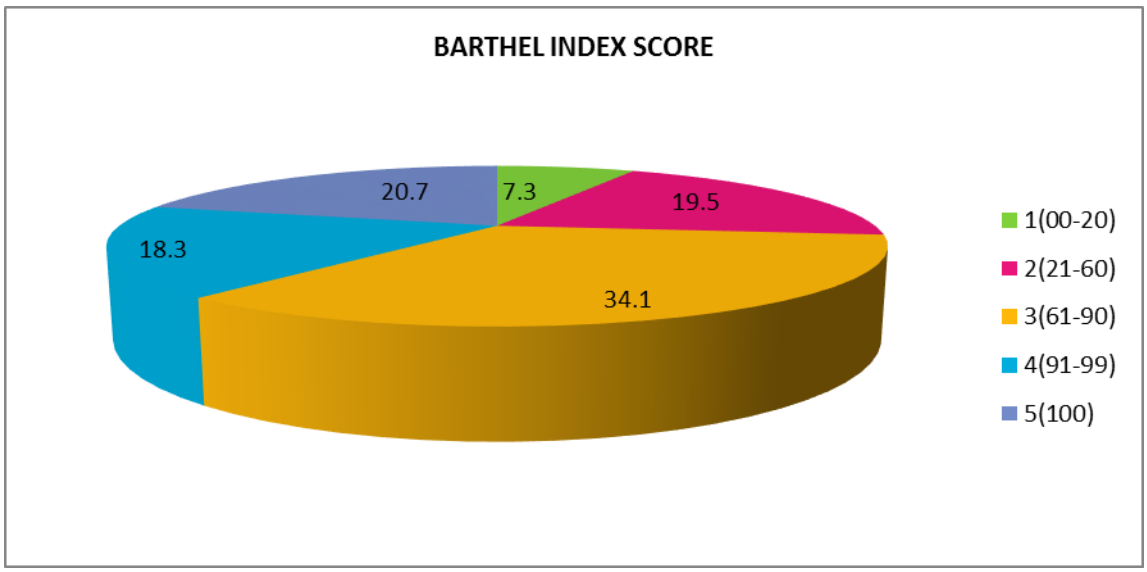


**Table 8- Frequency of Barthel index scale**

| Variable | Groups | Frequency | Percentage |
|---|---|---|---|
| Barthel index | 1(00-20) | 6 | 7.3 |
| | 2(21-60) | 16 | 19.5 |
| | 3(61-90) | 28 | 34.1 |
| | 4(91-99) | 15 | 18.3 |
| | 5(100) | 17 | 20.7 |



**Cross Tabulation**

**Table 9- Gender and MOCA score**

| sex | Moca | | | total |
|---|---|---|---|---|
| | 1 | 2 | 3 | |
| male | 25 | 14 | 1 | 40 |
| female | 27 | 15 | 0 | 42 |

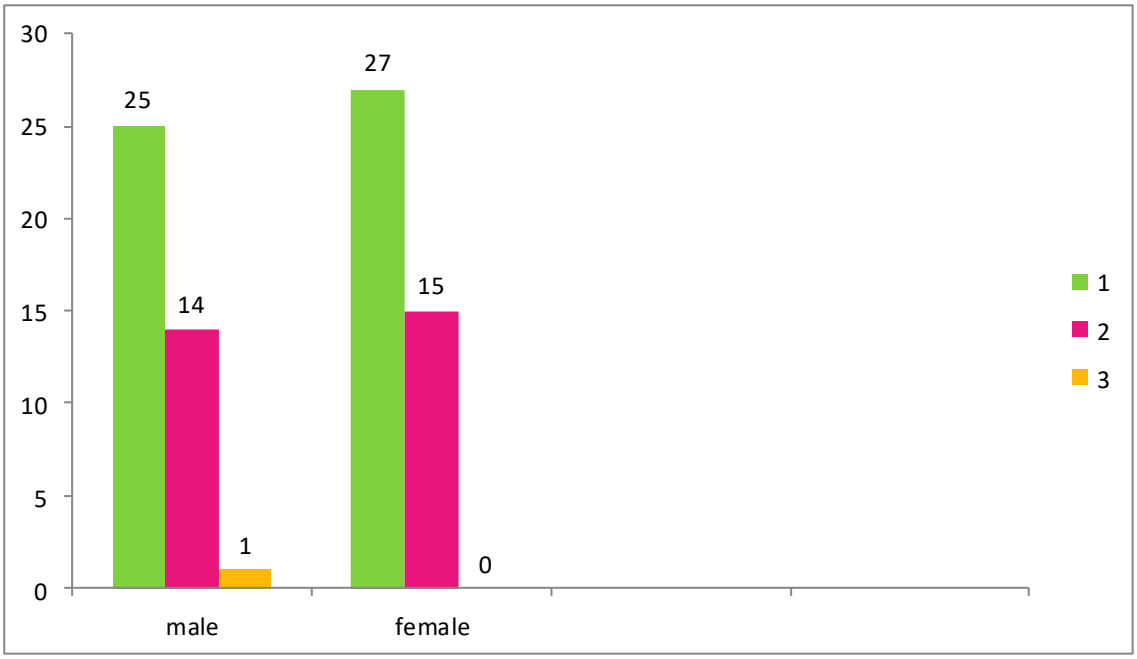


**Table 10- Gender and Barthel index score**

| Sex | Barthel Index Score | | | | | Total |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | |
| male | 0 | 9 | 14 | 8 | 9 | 40 |
| female | 6 | 7 | 14 | 7 | 8 | 42 |

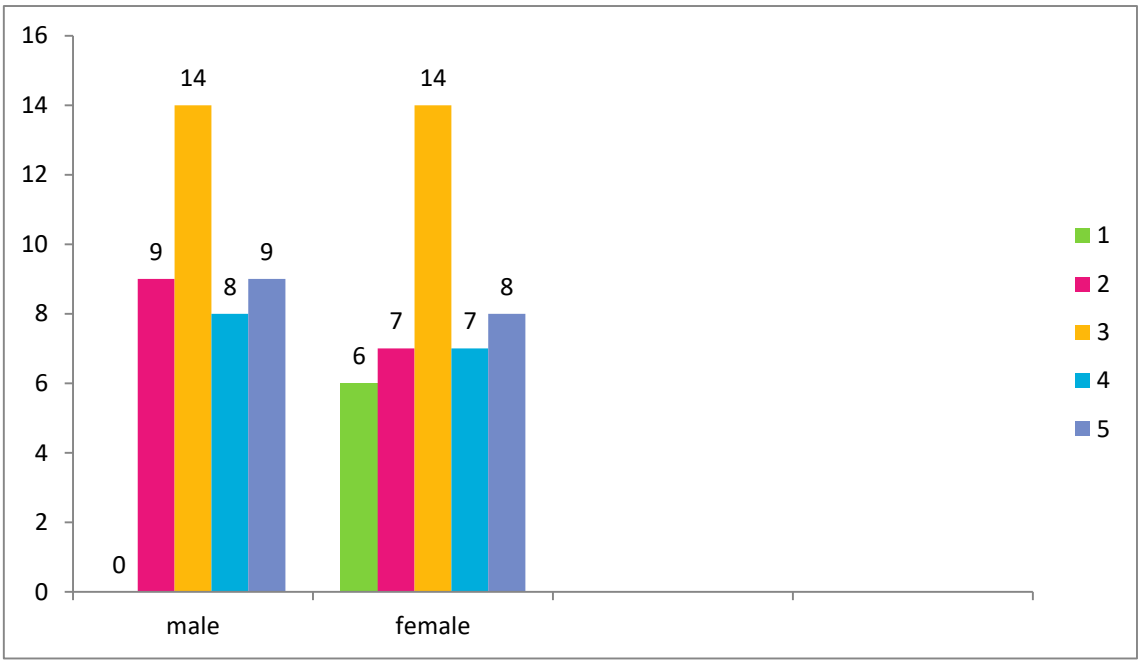


**Table 11-Gender and ABC score**

| Sex | ABC score | | Percentage | Total |
|---|---|---|---|---|
| | 1 | 2 | | |
| male | 1 | 39 | 47.5% | 40 |
| female | 2 | 40 | 48.7% | 42 |

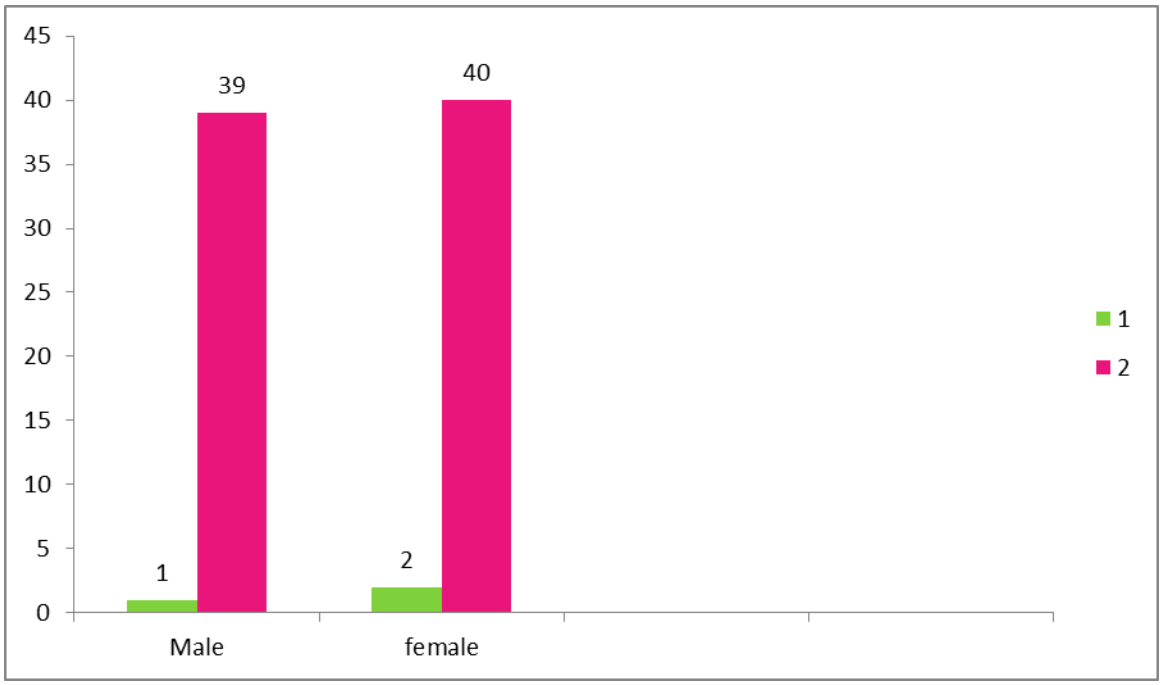


**Table 12- H&Y stages and MOCA Score**

| MOCA | H&Y STAGES | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 1.5 | 2 | 2.5 | 3 | 4 | 5 | |
| 1(< 21) | 5 | 4 | 13 | 8 | 3 | 7 | 9 | 3 | 52 |
| 2(21-26) | 3 | 4 | 9 | 5 | 1 | 4 | 3 | 0 | 29 |
| 3(>26) | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| total | 8 | 9 | 22 | 13 | 4 | 11 | 12 | 3 | 82 |

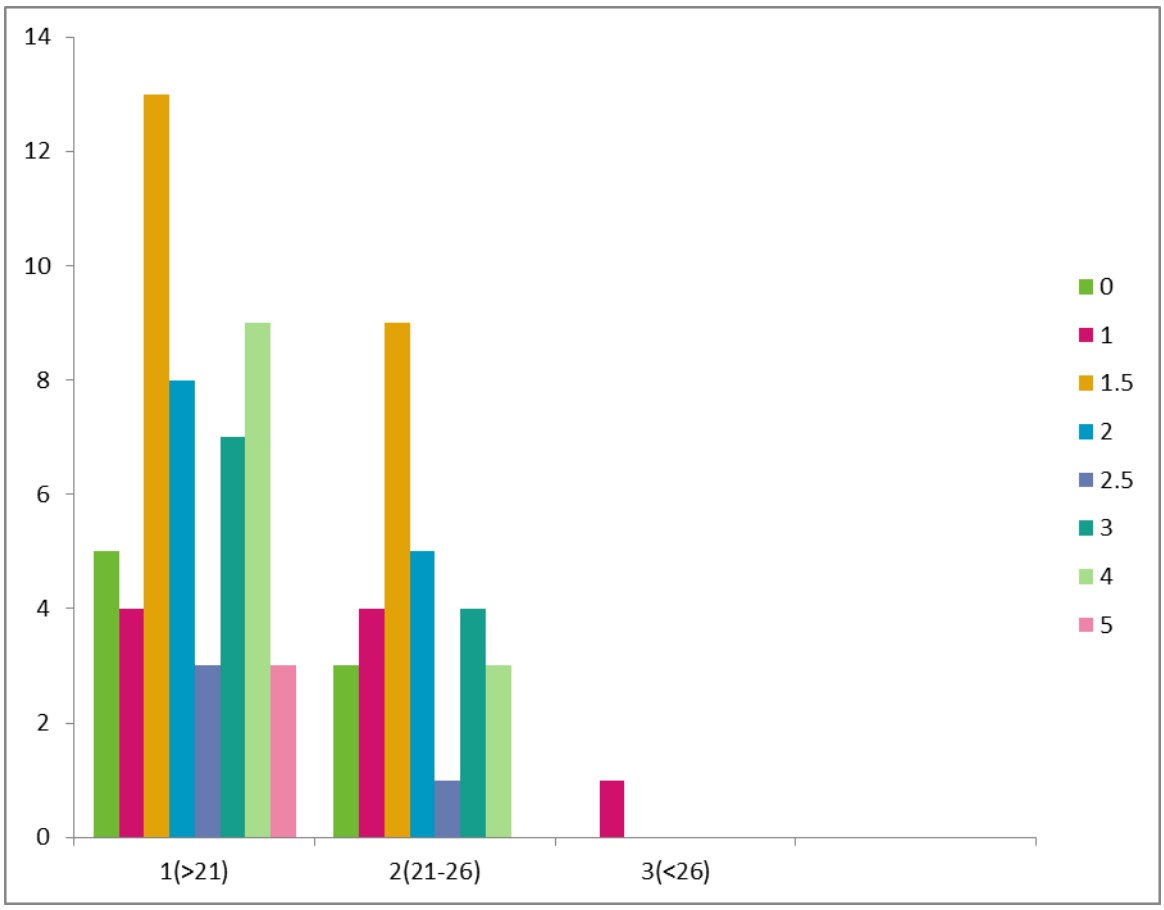


**Table 13-H&Y stages and Barthel index**

| BARTHEL | H&Y Stages | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 1.5 | 2 | 2.5 | 3 | 4 | 5 | |
| 1(0-20) | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 3 | 6 |
| 2(21-60) | 1 | 0 | 0 | 0 | 2 | 4 | 9 | 0 | 16 |
| 3(61-90) | 0 | 2 | 11 | 8 | 2 | 4 | 1 | 0 | 28 |
| 4(91-99) | 1 | 4 | 4 | 3 | 0 | 2 | 1 | 0 | 15 |
| 5(100) | 6 | 3 | 6 | 2 | 0 | 0 | 0 | 0 | 17 |
| total | 8 | 9 | 22 | 13 | 4 | 11 | 12 | 3 | 82 |

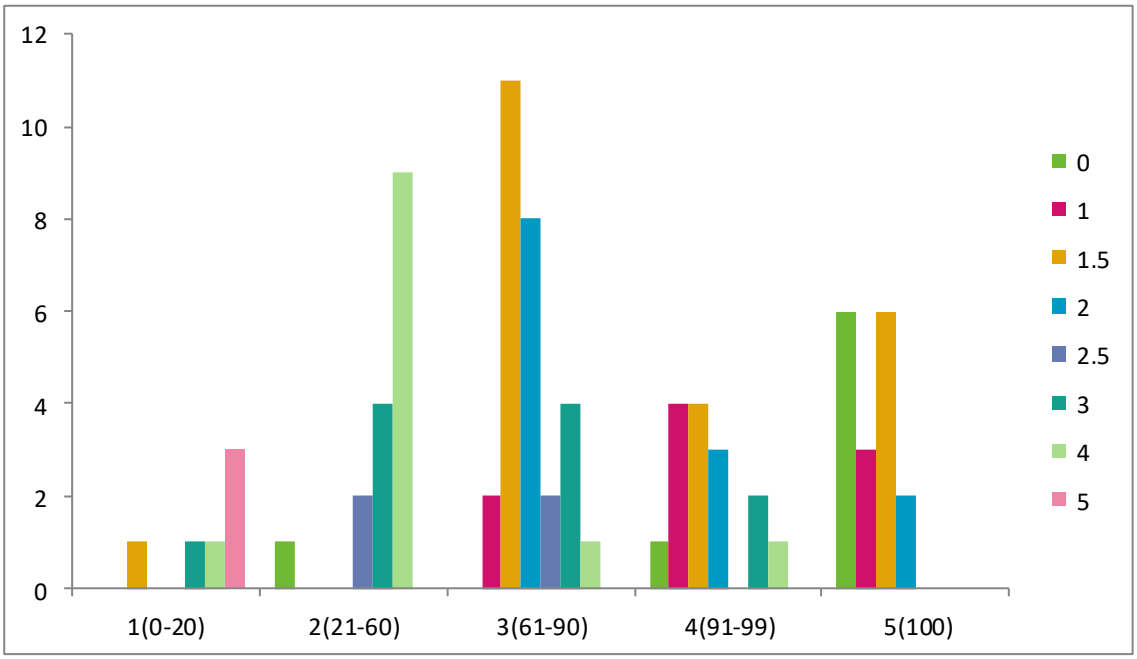


**Table 14- H&Y Stages and ABC scale**

| ABC | H&Y STAGES | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 1.5 | 2 | 2.5 | 3 | 4 | 5 | |
| 1(>75.6) | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 2(<75.6) | 7 | 7 | 22 | 13 | 4 | 11 | 12 | 3 | 79 |
| total | 8 | 9 | 22 | 13 | 4 | 11 | 12 | 3 | 82 |

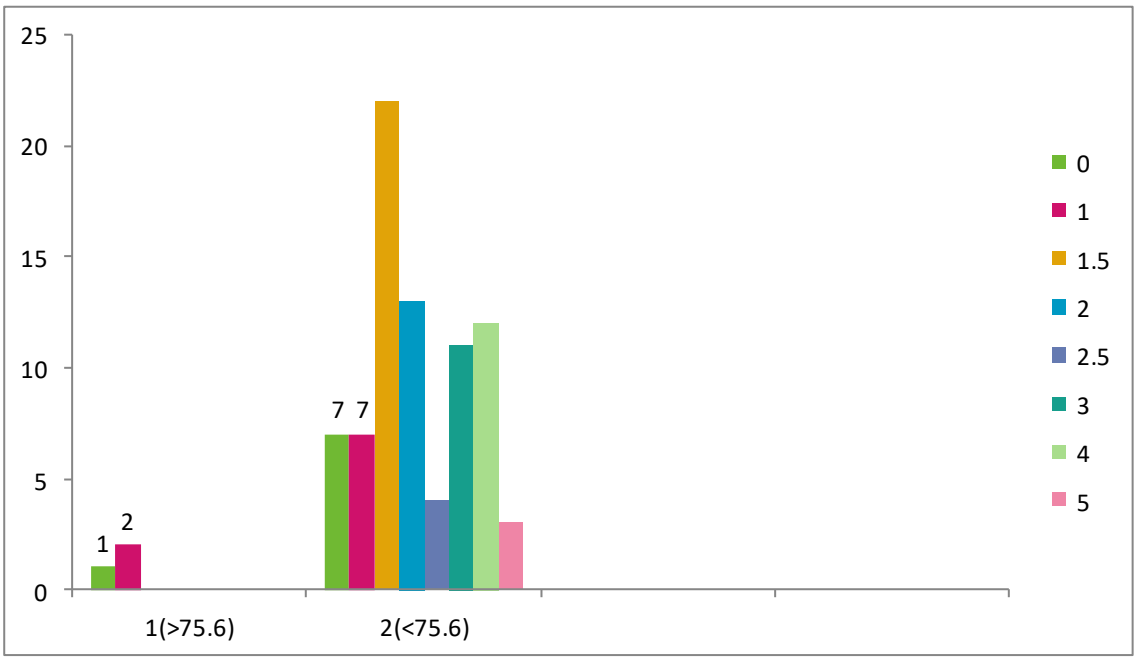


**Table 15- Chi-squared test analysis – for association between stages of PD and the Variables.**

| Group | Variable | Frequency | Percentage | P value |
|---|---|---|---|---|
| H&Y-BARTHEL | 1 | 6 | 7.3 | 0.000 |
| | 2 | 16 | 19.5 | |
| | 3 | 28 | 34.1 | |
| | 4 | 15 | 18.3 | |
| | 5 | 17 | 20.7 | |
| H&Y-MOCA | 1 | 52 | 63.4 | 0.633 |
| | 2 | 29 | 35.4 | |
| | 3 | 1 | 1.2 | |
| H&Y-ABC | 1 | 3 | 3.7 | .071 |
| | 2 | 79 | 96.3 | |

**Table 16- Correlation between stages and variables**

| | | Barthel group | ABC group | MOCA group |
|---|---|---|---|---|
| H&Y Group | Correlation Coefficient | -.679 | .262 | -.179 |
| | Sig(2 tailed) | .000 | .017 | .107 |

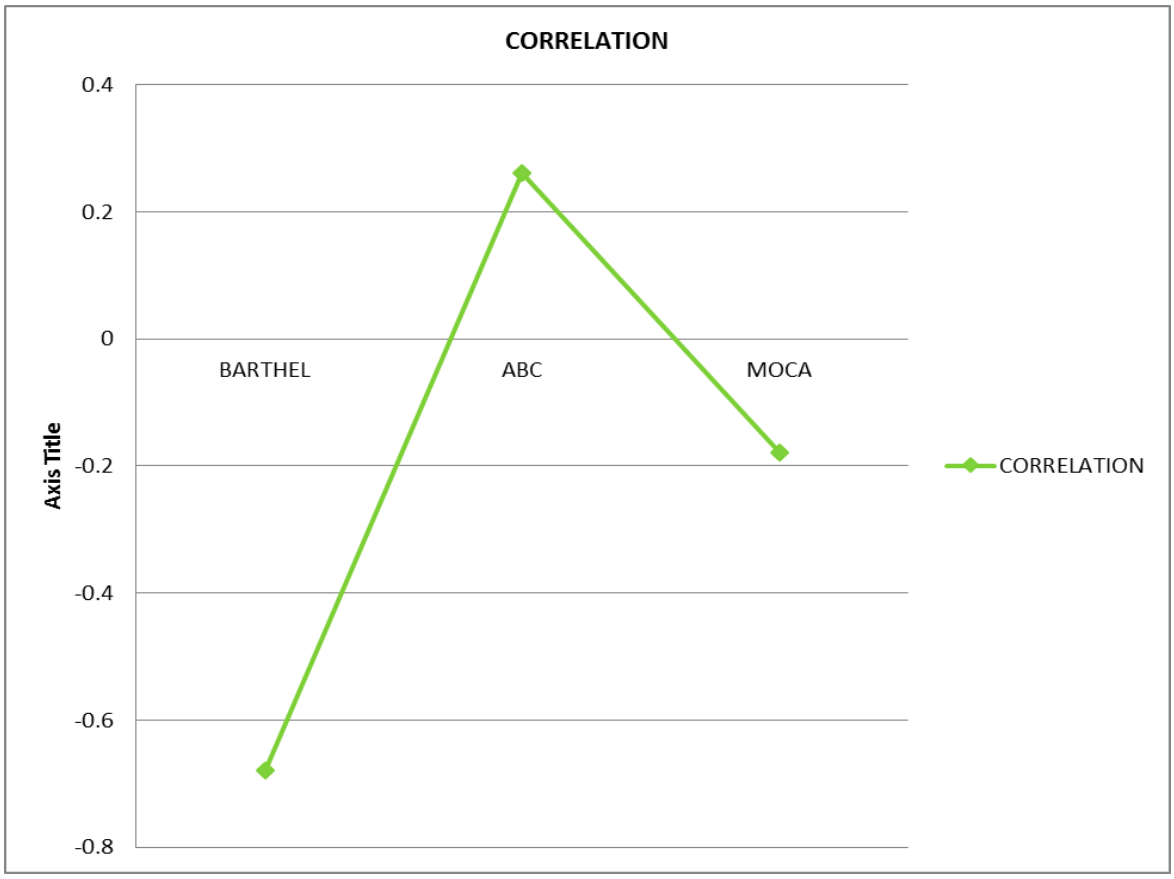


**Table 17- comparison between MOCA components**

| | Sum of squares | df | Mean square | F | Significance |
|---|---|---|---|---|---|
| Between groups | 849.352 | 6 | 141.559 | 90.842 | .000 |
| Within groups | 883.549 | 567 | 1.558 | | |
| Total | 1732.901 | 573 | | | |

**Table 17a-Post Hoc test-Multiple comparison Dependent variable-MOCA**

| Groups | Groups(J) | Mean difference (I-J) | Significant |
|---|---|---|---|
| 1.00 | 3.00 | -1.987 | .000 |
| | 5.00 | .621 | |
| | 7.00 | -2.963 | |
| 2.00 | 3.00 | -1.597 | .000 |
| | 5.00 | 1.0122 | |
| | 7.00 | -2.57 | |
| 3.00 | 4.00 | 2.146 | .000 |
| | 5.00 | 2.609 | |
| | 6.00 | 2.012 | |
| | 7.00 | -.975 | |
| 4.00 | 7.00 | -3.121 | .000 |
| 5.00 | 6.00 | -.597 | .037 |
| | 7.00 | -3.585 | .000 |
| 6.00 | 7.00 | -2.987 | .000 |

**Table 18- Comparison between ADL components**

| | Sum of squares | df | Mean square | F | Significance |
|---|---|---|---|---|---|
| Between groups | 5506.435 | 9 | 611.826 | 63.511 | .000 |
| Within groups | 7995.660 | 830 | 9.633 | | |
| Total | 13502.095 | 839 | | | |

**Table 18a. Comparison between components of ADL scale**

| Groups | Groups(J) | Mean difference (I-J) | Significant |
|---|---|---|---|
| 1.00 | 3.00 | 4.560 | .000 |
| | 4.00 | 4.195 | |
| | 5..00 | 4.670 | |
| | 6.00 | 4.987 | |
| | 7.00 | 7.817 | |
| | 8.00 | 4.538 | |
| | 9.00 | 8.065 | |
| | 10.00 | 4.463 | |
| 2.00 | 3.00 | 4.841 | |
| | 4.00 | 4.475 | |
| | 5.00 | 4.951 | 0.000 |
| | 6.00 | 5.268 | |
| | 7.00 | 8.097 | |
| | 8.00 | 4.818 | |
| | 9.00 | 8.346 | |
| | 10.00 | 4.74 | |
| 3.00 | 7.00 | 3.256 | 0.00 |
| | 9.00 | 3.504 | |
| 4.00 | 7.00 | 3.621 | 0.00 |
| | 9.00 | 3.870 | |
| 5.00 | 7.00 | 3.146 | 0.00 |
| | 9.00 | 3.395 | |
| 6.00 | 7.00 | 2.829 | 0.00 |
| | 9.00 | 3.078 | |
| 7.00 | 8.00 | -3.278 | 0.00 |
| | 10.00 | -3.353 | |
| 8.00 | 9.00 | 3.527 | 0.00 |
| 9.00 | 10.00 | -3.602 | 0.000 |

**Table-19-ODD'S Ratio**

| variable | OR | 95% confidence interval | | Significance |
|---|---|---|---|---|
| | | Upper bound | Lower bound | |
| MOCA | 0.631 | 0.366 | 0.917 | .097 |
| BARTHEL | 0.479 | 0.404 | 0.567 | .000 |
| ABC | 4.53 | 1.043 | 19.64 | .044 |

**Frequency and profile of PD**

A total of 82 patients with PD were included in the analysis .The characteristics of the patients are shown in table 1-8 respectively. The patients age ranged between 60 - 85 years (67.56±6.727), among whom 48.8% were male (n=40) with 26.8% (n=22) at 1.5 of Hoehn &Yahr stage of PD, having a mean duration time of disease as 43.07±41.43 months . 43% of whom were at 1.5 to 2 of Hoehn &Yahr stage and 27% were at stage 3 and 4 . Most of the female participants were house wife (33%) & the male participants were retired from work, with maximum patients having an education at SSLC level (56%).

Clinical characteristics of the participants showed that they had dementia mean score of 18.56±5.48, a moderate dependence in ADL with mean score of 74.24±27 and low activity balance confidence mean score of 47.23±18.08 (table1). A total of 63%(n=52) and35%(n= 29) of the participants were classified as having dementia & mild cognitive impairment respectively .Total number of patients with cognitive impairment were n= 22, of whom n=13 were with PD- D and n = 9 were with PD-MCI.(table 12) .These individuals with PD i.e **22% &13%** of them showed cognitive dysfunction at 1.5, 2 H&Y stage . Among the 7 cognitive domains attention, memory, visuospatial/ executive were the domains most affected.

Over all 34%(n=28) of patients were moderately dependent, 20%(n=16) were severely dependent & 7% (n-6) were totally dependent in all daily living skills(table-8). Most of the patients were (n=11) moderately dependent in daily living skills and at 1.5 Hoehn &Yahr stage (table 8). The perceived level of balance confidence while performing all daily living skills , shows that the 22 participants were found to be having lower balance confidence level and at 1.5 Hoehn &Yahr stage (Table 13) . Overall 96.3% (N=79) of the participants had a low balance confidence level. 22

patients with low balance were mostly found to be at 1.5 H&Y stage. Further it was found that stage 1.5 onwards the participants showed a low confidence in balance.

**Gender difference in cognitive deficit, activities of daily living skills and balance confidence**

Table 11 presents the descriptive analysis Montreal cognitive assessment in relation to gender. It shows that female participants (n=27) were more affected with dementia than male (n=25). There was no gender difference in daily living skills dependence, both male & female participants were moderately dependent in their daily living skills (n=14) (table 12). Also the female participants (48.8%,n=40) showed a lower balance confidence level than the male participants (48%,n=39) (table 13).

**Relationship between Parkinson's disease , Cognitive deficits, daily living skills &Balance confidence**

The Chi square analysis showed that there was a strong association between stages of Hoehn and Yahr and ADL( $p$= 0.000 ) rather than with cognition and balance confidence scale .

The Spearman's Correlation showed a weak negative correlation (r=-0.179) between cognitive deficit and H &Y stage of Parkinson's Disease, a moderate negative correlation (r=-0.679) between Hoehn &Yahr and Modified Barthel index, and a weak positive correlation (r=.262) between H & Y and balance confidence level (Table 16).

Table 17 shows that,there is statistically significant difference between the 7 components of Montreal Cognitive Assessment as determined by 1 way ANOVA(F=90.84,P=0.000)

A Tukey post Hoc test revealed that attention (P=.000),abstraction (P=.000),orientation(P=.000) were statistically significant ,when compared to visuospatial/ executive ,naming , language , memory. Further the table shows statistically significant difference in orientation when compared to language, memory ,naming, attention ,language, abstraction.(table-17a)

Table 18 shows that, there is statistically significant difference between the 10 components of Barthel (P=0.000) determinined by 1 way ANOVA.A Turkey post Hoc test reveal that chair/bed transfer, amblation,feeding were satistically significant difference when compare to stair climbing,toilet transfer,bowel control, bathing,dressing, personal hygiene ( table 18 a )

**Gender difference**

Table(10,11)There is no significant gender difference in all daily living skills(H&Y stage 3), and balance confidence(48%). In cognitive skills males are higher in their cognitive skills(table 9 )

The independent risk factors for PD at the various stages in the multivariate model were was found to be dependency in ADL and Balance confidence level (table19)

# DISCUSSION

## Cognitive Impairment

The results of the present study shows that among 82 of the cases who met criteria for Parkinson's Disease had a mean disease duration of <15 years and as short as 3 months for patients. Of the individuals with Parkinson's Disease **63%** found had dementia & other **35%** had mild cognitive impairment. Among these individuals with Parkinson's Disease **22% &13%** of them showed cognitive dysfunction at very early stages in the disease course i.e at H&Y 1.5,2 stage. These findings are consistent with those of previous studies although considerably lower results have been reported i.e **27.2%** reported with PDD and **36%** had PD-MCI[2]. Attention, memory, visuospatial/ executive were the domains most commonly affected[21] .This study further reveal that dementia, mild cognitive impairment may have increase risk for Parkinson's Disease Dementia(PDD) at early stages[13]. It was also found that as stage of Parkinson's Disease increases cognitive impairment increases. A cross sectional study conducted by Su-Yun Lee,Sung Kwan Kim(2016), it shows the possible progression of cognitive decline in patients with PD. They found that there was an apparent increase in severity and broadening of cognitive impairments as patients show increasing clinical disability as reflected in the Hoehn and Yahr stages. This could be because the cognitive deficits particularly those resembling frontal lobe progress in parallel with the motor deficit of PD and may reflect differing forms of neuropathological involvement.[32]

## Activities of daily living

Most of the patients had moderate dependency in all daily living skills. This could be related to the larger number of participants having dementia (63%). This is consistent with the finding of the study done by Pablo et al wherein they found that CISI-PD reached the highest coefficients with measures of disability (Barthel index r =- 0.67)[25]. Studies revealed that in all daily living skills impairment caused by cognitive worsening is a core criterion for diagnosis for Parkinson's Disease[14,15] and can occur in the preclinical phase. ADL skill disability (Barthel,3) was found in more in early stage of Parkinson's Disease (H&Y,1.5). The components of the daily living skills which were more affected were ambulation, stair climbing, toilet transfer,

bladder control,& feeding. Most of the clients were unable to climb stairs, had difficulty in bladder control, ambulation, chair/bed transfer. There was no association between stage of Parkinson 's disease & daily living skills where as there was a negative correlation between daily living skills & Parkinson's Disease indicating that when Parkinson's disease severity increases ADL skill performance decreases. A study conducted by Emily Rosenthal, 2010 says that cognition is associated with impairment in ADL even in no demented patients with PD[33].

The results suggest that MBI and ABC scale could help to identify patients of PD to be at high risk of dependency in ADL and have low balance confidence during everyday activities.

**Balance confidence**

Balance training improves postural stability and level of confidence while performing daily activities that require balance & reduces the frequency of falls in patients with Parkinson's Disease. The most important outcome in the present study was that 96% of the person's with Parkinson's Disease had a low balance confidence level at the early stages of Parkinson's Disease (H&Y1.5). This incidence is higher than that found in earlier studies. Disease severity as measured by Hoehn and Yahr stage or by the Unified Parkinson's Disease Rating Scale (UPDRS) was found to be significantly associated with recurrent falls in five of the seven studies[17]. Most of the participants showed low balance confidence during walking and transition from sit to stand. Though the study shows no association between stage of Parkinson's Disease &perceived balance capabilities. There was found to be strong correlation between the stage of Pakinson's Disease & balance confidence. This indicates that as the disease progresses the balance confidence reduces[8].ABC scores have been determined to be independently associated with increased risk of falling in individuals with PD.[30]

**Gender difference**

There is no specific difference in ADL skills and balance confidence. Males showed higher cognitive skill than female individuals with PD.

# CONCLUSION

The study reveals that cognitive dysfunction, ADL impairment and lack of balance confidence occurs in early stages of Parkinson's Disease. There is an association between stages of Parkinson's Disease, daily living skills impairment and balance confidence. Balance confidence was associated with Parkinson' Disease at an early stage. As Parkinson's Disease progresses there is more impairment in ADL than balance confidence and cognition. Thirdly a moderate negative correlation was found between ADL & stages, weak positive correlation between balance confidence and stages and a weak negative correlation with cognition. There was no significant gender difference in ADL and balance confidence, except that males had better coginitive skills than females.

Therefore Occupational Therapists need to address dysfunction in cognition, ADL and Balance confidence at early stages of Parkinson's disease.

# LIMITATIONS & RECOMMENDATIONS

- The study needs to verify these first results in larger cohorts.
- Future studies should focus on additional risk factors for MCI subtypes and their possible progression of dementia
- Further Study on ADL dysfunctions associated with PDD should be caused by cognitive worsening can be done.
- Future research must determine whether reducing fear of falling (FOF) will benefit individuals with PD.

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18.10.2016

To

Dr. V. Arul Selvan,
Consultant Neurologist.

Respected Sir / Madam,

Sub: Permission to conduct a study.

* * *

I would like to bring to your kind notice that one of our M.O.T student **Ms. M.Thamilarascy** of II year, is doing a project title **"A Cross sectional study to relate the stages of Parkinson's Disease with Cognitive deficits, Falls, and Activities of Daily Living."** Therefore, I request you to kindly refer persons with Parkinson's disease to her, to collect data on the above mentioned topic.

Thanking You,

Yours Sincerely,

15/10/16

**Mrs. Sujata Missal, M.Sc (OT).,**
**Principal.**

agreed

Dr. V. ARUL SELVAN
MD,DM(Neuro),MRCP(UK),FRCP(Lond),FRCP(Edin)
Consultant Neurologist
Reg. No : 47324
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18.10.2016

To

Dr. P. Baskar,
Consultant Neurologist.

Respected Sir / Madam,

Sub: Permission to conduct a study.

* * *

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Yours Sincerely,

18/10/16

**Mrs. Sujata Missal, M.Sc (OT).,**
**Principal.**

DR. P. BASKAR, M.D.D.M. (NEURO)
CONSULTANT NEUROLOGIST,
KOVAI MEDICAL CENTER HOSPITAL
COIMBATORE - 641 014.

I will help
Baskar 18/10/16


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18.10.2016

To

Dr. Senthi Kumar. E

Consultant Neurologist

Respected Sir / Madam,

Sub: Permission to conduct a study.

* * *

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Yours Sincerely,

18/10/16

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18.10.2016

To

Dr. Christopher,
Consultant Neurologist.

Respected Sir / Madam,

Sub: Permission to conduct a study.

* * *

I would like to bring to your kind notice that one of our M.O.T student **Ms. M.Thamilarascy** of II year, is doing a project title **"A Cross sectional study to relate the stages of Parkinson's Disease with Cognitive deficits, Falls, and Activities of Daily Living."** Therefore, I request you to kindly refer persons with Parkinson's disease to her, to collect data on the above mentioned topic.

Thanking You,

Yours Sincerely,

18/10/16

**Mrs. Sujata Missal, M.Sc (OT).,**
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21/10/16

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# APPENDIX

Patient Name: _____ Date: _____

## The Activities-specific Balance Confidence (ABC) Scale*

**Instructions to Participants:** For each of the following activities, please indicate your level of confidence in doing the activity without losing your balance or becoming unsteady from choosing one of the percentage points on the scale from 0% to 100% If you do not currently do the activity in question, try and imagine how confident you would be if you had to do the activity. If you normally use a walking aid to do the activity or hold onto someone, rate your confidence as if you were using these supports.

0% 10 20 30 40 50 60 70 80 90 100%

No Confidence Completely Confident

How confident are you that you will not lose your balance or become unsteady when you...

1. ...walk around the house? _____%
2. ...walk up or down stairs? _____%
3. ...bend over and pick up a slipper from the front of a closet floor? _____%
4. ...reach for a small can off a shelf at eye level? _____%
5. ...stand on your tip toes and reach for something above your head? _____%
6. ...stand on a chair and reach for something? _____%
7. ...sweep the floor? _____%
8. ...walk outside the house to a car parked in the driveway? _____%
9. ...get into or out of a car? _____%
10. ...walk across a parking lot to the mall? _____%
11. ...walk up or down a ramp? _____%
12. ...walk in a crowded mall where people rapidly walk past you? _____%
13. ...are bumped into by people as you walk through the mall? _____%
14. ...step onto or off of an escalator while you are holding onto a railing? _____%
15. ...step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing? _____%
16. ...walk outside on icy sidewalks? _____%

*Powell LE & Myers AM. The Activities-specific Balance Confidence (ABC) Scale. Journal of Gerontology Med Sci 1995; 50(1):M28-34.

**Total ABC Score:** _____

**Scoring:** _____ / 16 = _____% of self confidence

**Total ABC Score**

**MEDICARE PATIENTS ONLY**

100% - _____% Function = _____% Impairment

Patient Signature: _____ Date: _____

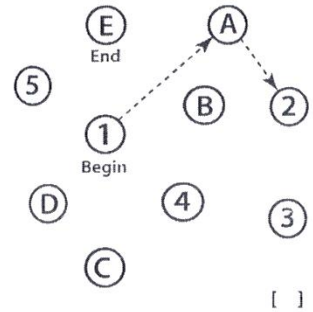
Therapist Signature: _____ Date: _____

NAME :

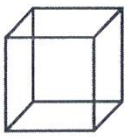
MONTREAL COGNITIVE ASSESSMENT (MOCA)
Version 7.1 Original Version

Education : Date of birth :
Sex : DATE :

**VISUOSPATIAL / EXECUTIVE**




Copy cube



[ ] [ ]

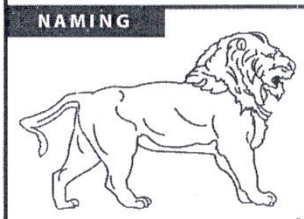
Draw CLOCK (Ten past eleven)
( 3 points )

[ ] Contour [ ] Numbers [ ] Hands

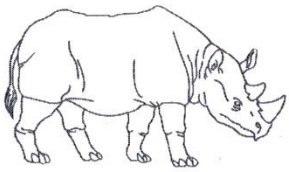
POINTS

__/5

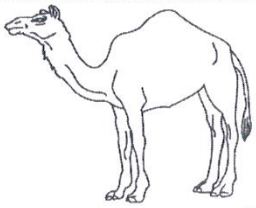
**NAMING**



[ ]



[ ]



[ ]

__/3

**MEMORY** Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.

| | FACE | VELVET | CHURCH | DAISY | RED |
|---|---|---|---|---|---|
| 1st trial | | | | | |
| 2nd trial | | | | | |

No points

**ATTENTION** Read list of digits (1 digit/ sec.).

Subject has to repeat them in the forward order [ ] 2 1 8 5 4

Subject has to repeat them in the backward order [ ] 7 4 2

__/2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors

[ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B

__/1

Serial 7 subtraction starting at 100 [ ] 93 [ ] 86 [ ] 79 [ ] 72 [ ] 65

4 or 5 correct subtractions: **3 pts**, 2 or 3 correct: **2 pts**, 1 correct: **1 pt**, 0 correct: **0 pt**

__/3

**LANGUAGE** Repeat : I only know that John is the one to help today. [ ]

The cat always hid under the couch when dogs were in the room. [ ]

__/2

Fluency / Name maximum number of words in one minute that begin with the letter F [ ] _____ (N ≥ 11 words)

__/1

**ABSTRACTION** Similarity between e.g. banana - orange = fruit [ ] train – bicycle [ ] watch - ruler

__/2

**DELAYED RECALL**

| | FACE | VELVET | CHURCH | DAISY | RED |
|---|---|---|---|---|---|
| Has to recall words WITH NO CUE | [ ] | [ ] | [ ] | [ ] | [ ] |
| **Optional** Category cue | | | | | |
| **Optional** Multiple choice cue | | | | | |

Points for UNCUED recall only

__/5

**ORIENTATION** [ ] Date [ ] Month [ ] Year [ ] Day [ ] Place [ ] City

__/6

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Normal ≥ 26 / 30

TOTAL __/30

Add 1 point if ≤ 12 yr edu

Administered by: _____

Appendix 3

*MODIFIED BARTHEL INDEX (SHAH VERSION) : SELF CARE ASSESSMENT*

| INDEX ITEM | SCORE | DESCRIPTION |
|---|---|---|
| *CHAIR/BED TRANSFERS* | 0 | Unable to participate in a transfer. Two attendants are required to transfer the patient with or without a mechanical device. |
| | 3 | Able to participate but maximum assistance of one other person is require in all aspects of the transfer. |
| | 8 | The transfer requires the assistance of one other person. Assistance may be required in any aspect of the transfer. |
| | 12 | The presence of another person is required either as a confidence measure, or to provide supervision for safety. |
| | 15 | The patient can safely approach the bed walking or in a wheelchair, lock brakes, lift footrests, or position walking aid, move safely to bed, lie down, come to a sitting position on the side of the bed, change the position of the wheelchair, transfer back into it safely and/or grasp aid and stand. The patient must be independent in all phases of this activity. |
| *AMBULATION* | 0 | Dependent in ambulation. |
| | 3 | Constant presence of one or more assistant is required during ambulation. |
| | 8 | Assistance is required with reaching aids and/or their manipulation. One person is required to offer assistance. |
| | 12 | The patient is independent in ambulation but unable to walk 50 metres without help, or supervision is needed for confidence or safety in hazardous situations. |
| | 15 | The patient must be able to wear braces if required, lock and unlock these braces assume standing position, sit down, and place the necessary aids into position for use. The patient must be able to crutches, canes, or a walkarette, and walk 50 metres without help or supervision. |
| *AMBULATION/WHEELCHAIR*<br><br>* **(If unable to walk)**<br><br>**Only use this item if the patient is rated "0" for Ambulation, and then only if the patient has been trained in wheelchair management.** | 0 | Dependent in wheelchair ambulation. |
| | 1 | Patient can propel self short distances on flat surface, but assistance is required for all other steps of wheelchair management. |
| | 3 | Presence of one person is necessary and constant assistance is required to manipulate chair to table, bed, etc. |
| | 4 | The patient can propel self for a reasonable duration over regularly encountered terrain. Minimal assistance may still be required in "tight corners" or to negotiate a kerb 100mm high. |
| | 5 | To propel wheelchair independently, the patient must be able to go around corners, turn around, manoeuvre the chair to a table, bed, toilet, etc. The patient must be able to push a chair at least 50 metres and negotiate a kerb. |

| INDEX ITEM | SCORE | DESCRIPTION |
|---|---|---|
| *STAIR CLIMBING* | 0 | The patient is unable to climb stairs. |
| | 2 | Assistance is required in all aspects of chair climbing, including assistance with walking aids. |
| | 5 | The patient is able to ascend/descend but is unable to carry walking aids and needs supervision and assistance. |
| | 8 | Generally no assistance is required. At times supervision is required for safety due to morning stiffness, shortness of breath, etc. |
| | 10 | The patient is able to go up and down a flight of stairs safely without help or supervision. The patient is able to use hand rails, cane or crutches when needed and is able to carry these devices as he/she ascends or descends. |
| | | |
| *TOILET TRANSFERS* | 0 | Fully dependent in toileting. |
| | 2 | Assistance required in all aspects of toileting. |
| | 5 | Assistance may be required with management of clothing, transferring, or washing hands. |
| | 8 | Supervision may be required for safety with normal toilet. A commode may be used at night but assistance is required for emptying and cleaning. |
| | 10 | The patient is able to get on/off the toilet, fasten clothing and use toilet paper without help. If necessary, the patient may use a bed pan or commode or urinal at night, but must be able to empty it and clean it. |
| | | |
| *BOWEL CONTROL* | 0 | The patient is bowel incontinent. |
| | 2 | The patient needs help to assume appropriate position, and with bowel movement facilitatory techniques. |
| | 5 | The patient can assume appropriate position, but cannot use facilitatory techniques or clean self without assistance and has frequent accidents. Assistance is required with incontinence aids such as pad, etc. |
| | 8 | The patient may require supervision with the use of suppository or enema and has occasional accidents. |
| | 10 | The patient can control bowels and has no accidents, can use suppository, or take an enema when necessary. |
| | | |
| *BLADDER CONTROL* | 0 | The patient is dependent in bladder management, is incontinent, or has indwelling catheter. |
| | 2 | The patient is incontinent but is able to assist with the application of an internal or external device. |
| | 5 | The patient is generally dry by day, but not at night and needs some assistance with the devices. |
| | 8 | The patient is generally dry by day and night, but may have an occasional accident or need minimal assistance with internal or external devices. |
| | 10 | The patient is able to control bladder day and night, and/or is independent with internal or external devices. |

| INDEX ITEM | SCORE | DESCRIPTION |
|---|---|---|
| *BATHING* | 0 | Total dependence in bathing self. |
| | 1 | Assistance is required in all aspects of bathing, but patient is able to make some contribution. |
| | 3 | Assistance is required with either transfer to shower/bath or with washing or drying; including inability to complete a task because of condition or disease, etc. |
| | 4 | Supervision is required for safety in adjusting the water temperature, or in the transfer. |
| | 5 | The patient may use a bathtub, a shower, or take a complete sponge bath. The patient must be able to do all the steps of whichever method is employed without another person being present. |
| *DRESSING* | 0 | The patient is dependent in all aspects of dressing and is unable to participate in the activity. |
| | 2 | The patient is able to participate to some degree, but is dependent in all aspects of dressing. |
| | 5 | Assistance is needed in putting on, and/or removing any clothing. |
| | 8 | Only minimal assistance is required with fastening clothing such as buttons, zips, bra, shoes, etc. |
| | 10 | The patient is able to put on, remove, corset, braces, as prescribed. |
| *PERSONAL HYGIENE* *(Grooming)* | 0 | The patient is unable to attend to personal hygiene and is dependent in all aspects. |
| | 1 | Assistance is required in all steps of personal hygiene, but patient able to make some contribution. |
| | 3 | Some assistance is required in one or more steps of personal hygiene. |
| | 4 | Patient is able to conduct his/her own personal hygiene but requires minimal assistance before and/or after the operation. |
| | 5 | The patient can wash his/her hands and face, comb hair, clean teeth and shave. A male patient may use any kind of razor but must insert the blade, or plug in the razor without help, as well as retrieve it from the drawer or cabinet. A female patient must apply her own make-up, if used, but need not braid or style her hair. |
| *FEEDING* | 0 | Dependent in all aspects and needs to be fed, nasogastric needs to be administered. |
| | 2 | Can manipulate an eating device, usually a spoon, but someone must provide active assistance during the meal. |
| | 5 | Able to feed self with supervision. Assistance is required with associated tasks such as putting milk/sugar into tea, salt, pepper, spreading butter, turning a plate or other "set up" activities. |
| | 8 | Independence in feeding with prepared tray, except may need meat cut, milk carton opened or jar lid etc. The presence of another person is not required. |
| | 10 | The patient can feed self from a tray or table when someone puts the food within reach. The patient must put on an assistive device if needed, cut food, and if desired use salt and pepper, spread butter, etc. |

| SCORE | INTERPRETATION |
|---|---|
| 00 - 20 | Total Dependence |
| 21 - 60 | Severe Dependence |
| 61 - 90 | Moderate Dependence |
| 91 - 99 | Slight Dependence |
| - 100 | Independence |

| SCORE | PREDICTION |
|---|---|
| Less Than 40 | Unlikely to go home<br>- Dependent in Mobility<br>- Dependent in Self Care |
| 60 | Pivotal score where patients move from dependency to assisted independence. |
| 60 - 80 | If living alone will probably need a number of community services to cope. |
| More Than 85 | Likely to be discharged to community living<br>- Independent in transfers and able to walk or use wheelchair independently. |

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9787570475

Case No: 51

INFORMED CONSENT FORM

I C. Arunachalam voluntarily consent to participate in the research study, "A CROSS SECTIONAL STUDY TO RELATE THE STAGES OF PARKINSON'S DISEASE WITH COGNITIVE DEFICITS,FALLS, AND ACTIVITIES OF DAILY LIVING".

The researcher has explained me the content of her research in brief, what she needs to interview from me and has answered the questions related to the research to my satisfaction.

SIGNATURE OF PARTICIPANT: V.C Arunachalam

SIGNATURE OF WITNESS: Bothiraman

SIGNATURE OF RESEARCHER: M. Thanalakshmi

PLACE: Coimbatore

DATE: 14/11/2018

# DEMOGRAPHIC DATA COLLECTION FORM

Name : Mr. C. Arunachamy age: 64 yrs.

Consultant physician: Dr. Arul selvan gender: Male

Hospital name: K.M.C. Hospital ward: -

Date of assessment: 14/11/2016. ~~Ip~~/op no: 123962

Duration of illness: 1½ yrs. occupation: Farmer.

Education: 9th std. Associative factor: DP(-), Sugar(-)

Diagnosis: Idiopathic Parkinsons disease.

H/Y Stages: 1.5y

MOCA Score: 21

ABC SCORE: 1100

MODIFIED BARTHEL INDEX SCORE: 100

| Name | | age | sex | occupation | duration-m | education | H/Y | M- V&E | M-N | M-A | M-L | M-AB | M-DR | M-O | TOTAL | B-CHAIR | B-AMB | B-STAIR | B-TOILET | B-BOWEL | B-BLAD | B-BATH | B-DRESS | B-PH | B-FEED | TOTAL | ABC score | associative | | % | scoring |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sudhaa | 62 | 1 | 0 | 2 | 72 | 4 | 5 | 1 | 1 | 0 | 1 | 0 | 1 | 3 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 140 | 0 | 0.0875 | 8.8 | 0.01 |
| poovathal | 68 | 2 | 0 | 2 | 6 | 1 | 1 | 0 | 2 | 3 | 2 | 1 | 3 | 4 | 16 | 12 | 12 | 10 | 8 | 5 | 8 | 5 | 10 | 4 | 10 | 84 | 710 | 0 | 0.44375 | 44.4 | 0.03 |
| subramanian | 76 | 4 | 1 | 1 | 1 | 3 | 1 | 0 | 3 | 5 | 2 | 2 | 2 | 1 | 15 | 8 | 15 | 2 | 5 | 2 | 5 | 1 | 0 | 0 | 2 | 40 | 830 | 0 | 0.51875 | 51.9 | 0.03 |
| chellapandiyan | 60 | 1 | 1 | 1 | 6 | 3 | 1 | 3 | 3 | 4 | 2 | 2 | 3 | 6 | 24 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 1270 | 0 | 0.79375 | 79.4 | 0.05 |
| jothi | 69 | 2 | 0 | 1 | 24 | 1 | 1 | 4 | 3 | 4 | 1 | 0 | 3 | 6 | 23 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 1120 | 0 | 0.7 | 70.0 | 0.04 |
| kaliammal | 74 | 3 | 0 | 2 | 12 | 2 | 1 | 2 | 2 | 0 | 2 | 2 | 2 | 5 | 15 | 15 | 15 | 8 | 10 | 8 | 8 | 4 | 10 | 5 | 10 | 95 | 760 | 1 | 0.475 | 47.5 | 0.03 |
| subbash | 70 | 2 | 1 | 4 | 12 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 3 | 6 | 18 | 12 | 12 | 8 | 8 | 8 | 8 | 4 | 10 | 4 | 8 | 82 | 870 | 0 | 0.54375 | 54.4 | 0.03 |
| thangammal | 60 | 1 | 0 | 2 | 2 | 1 | 1 | 2 | 3 | 6 | 2 | 1 | 0 | 6 | 20 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 1100 | 0 | 0.6875 | 68.8 | 0.04 |
| kumaraswamy | 70 | 2 | 1 | 3 | 2 | 4 | 1 | 3 | 3 | 5 | 2 | 2 | 4 | 6 | 24 | 15 | 15 | 8 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 98 | 420 | 0 | 0.2625 | 26.3 | 0.02 |
| chinnaswamy | 74 | 3 | 1 | 1 | 90 | 1 | 1 | 3 | 3 | 6 | 2 | 2 | 4 | 6 | 26 | 15 | 15 | 8 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 98 | 1270 | 0 | 0.79375 | 79.4 | 0.05 |
| chandrasekaran | 63 | 1 | 1 | 3 | 12 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 4 | 14 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 930 | 0 | 0.58125 | 58.1 | 0.04 |
| usman | 67 | 2 | 1 | 4 | 6 | 3 | 1 | 5 | 2 | 5 | 2 | 2 | 1 | 6 | 23 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 960 | 0 | 0.6 | 60.0 | 0.04 |
| malarvili | 60 | 1 | 0 | 2 | 2 | 3 | 1 | 5 | 3 | 6 | 3 | 2 | 1 | 6 | 26 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 1200 | 0 | 0.75 | 75.0 | 0.05 |
| ramani | 63 | 1 | 0 | 4 | 24 | 4 | 1 | 3 | 3 | 6 | 2 | 2 | 2 | 6 | 24 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 1150 | 4 | 0.71875 | 71.9 | 0.04 |
| duriswamy | 66 | 2 | 1 | 4 | 3 | 4 | 1 | 2 | 2 | 5 | 3 | 2 | 1 | 6 | 21 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 960 | 4 | 0.6 | 60.0 | 0.04 |
| mohammed | 60 | 1 | 1 | 4 | 6 | 2 | 1 | 1 | 2 | 4 | 2 | 1 | 3 | 5 | 17 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 1250 | 0 | 0.78125 | 78.1 | 0.05 |
| meenaksi | 70 | 2 | 0 | 2 | 18 | 1 | 1 | 1 | 1 | 4 | 2 | 0 | 2 | 4 | 14 | 15 | 15 | 10 | 10 | 10 | 5 | 5 | 10 | 3 | 10 | 93 | 810 | 0 | 0.50625 | 50.6 | 0.03 |
| ramathal | 65 | 1 | 0 | 2 | 9 | 3 | 1 | 5 | 3 | 6 | 2 | 2 | 4 | 6 | 28 | 15 | 15 | 10 | 10 | 10 | 8 | 4 | 8 | 4 | 10 | 94 | 1100 | 0 | 0.6875 | 68.8 | 0.04 |
| betray gowder | 80 | 4 | 1 | 4 | 48 | 1 | 1.5 | 3 | 3 | 2 | 1 | 1 | 4 | 6 | 24 | 15 | 15 | 8 | 8 | 8 | 8 | 5 | 8 | 4 | 5 | 86 | 490 | 0 | 0.30625 | 30.6 | 0.02 |
| vishwanathan | 63 | 1 | 1 | 1 | 6 | 2 | 1.5 | 4 | 2 | 3 | 1 | 2 | 4 | 6 | 22 | 12 | 12 | 10 | 10 | 5 | 8 | 5 | 8 | 5 | 2 | 77 | 830 | 0 | 0.51875 | 51.9 | 0.03 |
| sachan | 71 | 3 | 1 | 4 | 72 | 1 | 1.5 | 2 | 3 | 4 | 2 | 1 | 4 | 6 | 22 | 12 | 12 | 8 | 8 | 8 | 5 | 5 | 10 | 5 | 5 | 78 | 850 | 0 | 0.53125 | 53.1 | 0.03 |
| kaliannan | 75 | 3 | 1 | 1 | 84 | 2 | 1.5 | 2 | 2 | 0 | 2 | 1 | 1 | 2 | 10 | 15 | 15 | 10 | 10 | 2 | 5 | 3 | 10 | 5 | 10 | 80 | 580 | 0 | 0.3625 | 36.3 | 0.02 |
| manimagali | 64 | 1 | 0 | 3 | 48 | 2 | 1.5 | 2 | 3 | 5 | 2 | 2 | 2 | 5 | 21 | 15 | 15 | 10 | 10 | 8 | 8 | 5 | 10 | 5 | 10 | 96 | 680 | 0 | 0.425 | 42.5 | 0.03 |
| mohammed | 66 | 2 | 1 | 3 | 12 | 1 | 1.5 | 2 | 2 | 5 | 1 | 1 | 3 | 6 | 20 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 960 | 0 | 0.6 | 60.0 | 0.04 |
| achammal | 65 | 1 | 0 | 2 | 24 | 3 | 1.5 | 4 | 3 | 4 | 2 | 2 | 4 | 5 | 24 | 15 | 15 | 8 | 10 | 8 | 8 | 5 | 10 | 5 | 10 | 96 | 970 | 0 | 0.60625 | 60.6 | 0.04 |
| ashokumar | 60 | 1 | 1 | 3 | 12 | 1 | 1.5 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 3 | 3 | 3 | 0 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 18 | 320 | 4 | 0.2 | 20.0 | 0.01 |
| beevi | 60 | 1 | 0 | 2 | 6 | 1 | 1.5 | 1 | 3 | 1 | 1 | 1 | 3 | 3 | 13 | 12 | 15 | 8 | 8 | 8 | 10 | 5 | 8 | 5 | 10 | 89 | 760 | 0 | 0.475 | 47.5 | 0.03 |
| hussain | 76 | 4 | 1 | 4 | 12 | 4 | 1.5 | 3 | 2 | 5 | 2 | 0 | 3 | 5 | 20 | 12 | 12 | 8 | 5 | 8 | 5 | 3 | 5 | 3 | 5 | 66 | 600 | 0 | 0.375 | 37.5 | 0.02 |
| kunji mohammed2 | 68 | 2 | 1 | 3 | 36 | 1 | 1.5 | 3 | 3 | 6 | 2 | 1 | 0 | 5 | 20 | 15 | 15 | 8 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 98 | 1000 | 0 | 0.625 | 62.5 | 0.04 |
| panjali | 70 | 2 | 0 | 2 | 24 | 1 | 1.5 | 3 | 2 | 3 | 2 | 2 | 2 | 6 | 20 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 920 | 0 | 0.575 | 57.5 | 0.04 |
| jothi | 64 | 1 | 0 | 2 | 18 | 1 | 1.5 | 4 | 3 | 6 | 2 | 2 | 0 | 4 | 21 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 1100 | 0 | 0.6875 | 68.8 | 0.04 |
| panjalingam | 77 | 4 | 1 | 4 | 48 | 3 | 1.5 | 4 | 3 | 5 | 0 | 0 | 5 | 6 | 24 | 15 | 15 | 8 | 8 | 10 | 10 | 4 | 10 | 5 | 10 | 95 | 960 | 0 | 0.6 | 60.0 | 0.04 |
| arumugam | 70 | 2 | 0 | 3 | 30 | 2 | 1.5 | 2 | 2 | 5 | 2 | 2 | 0 | 4 | 17 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 900 | 0 | 0.5625 | 56.3 | 0.04 |
| soundarajan | 60 | 1 | 1 | 3 | 30 | 1 | 1.5 | 1 | 3 | 5 | 2 | 2 | 0 | 5 | 18 | 12 | 12 | 8 | 5 | 2 | 2 | 4 | 8 | 4 | 8 | 65 | 710 | 0 | 0.44375 | 44.4 | 0.03 |
| palanimuthu | 62 | 1 | 1 | 1 | 10 | 1 | 1.5 | 2 | 2 | 1 | 2 | 2 | 1 | 5 | 15 | 15 | 15 | 8 | 8 | 8 | 8 | 4 | 8 | 1 | 10 | 85 | 1100 | 6 | 0.6875 | 68.8 | 0.04 |
| periyanayaki | 60 | 1 | 0 | 2 | 12 | 1 | 1.5 | 4 | 2 | 6 | 2 | 2 | 2 | 6 | 24 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 780 | 0 | 0.4875 | 48.8 | 0.03 |
| ponmanidevi | 78 | 4 | 0 | 4 | 6 | 1 | 1.5 | 2 | 2 | 5 | 2 | 2 | 1 | 6 | 20 | 15 | 15 | 10 | 10 | 8 | 5 | 5 | 10 | 5 | 10 | 80 | 960 | 0 | 0.6 | 60.0 | 0.04 |
| muthsamy | 76 | 4 | 1 | 1 | 36 | 1 | 1.5 | 2 | 3 | 6 | 3 | 2 | 2 | 5 | 23 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 910 | 0 | 0.56875 | 56.9 | 0.04 |
| pathmna | 62 | 1 | 0 | 2 | 24 | 1 | 1.5 | 2 | 2 | 5 | 2 | 2 | 3 | 6 | 22 | 12 | 12 | 5 | 8 | 5 | 2 | 4 | 5 | 4 | 8 | 65 | 740 | 2 | 0.4625 | 46.3 | 0.03 |
| durisamy | 65 | 1 | 1 | 1 | 24 | 1 | 1.5 | 5 | 3 | 5 | 3 | 1 | 2 | 6 | 25 | 15 | 15 | 8 | 10 | 8 | 8 | 5 | 8 | 4 | 8 | 80 | 840 | 0 | 0.525 | 52.5 | 0.03 |
| ramanathan | 60 | 1 | 1 | 1 | 60 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 3 | 5 | 15 | 12 | 15 | 8 | 8 | 8 | 8 | 5 | 8 | 3 | 8 | 80 | 480 | 0 | 0.3 | 30.0 | 0.02 |
| habeebullah | 83 | 5 | 1 | 3 | 12 | 1 | 2 | 0 | 3 | 1 | 1 | 0 | 3 | 3 | 11 | 15 | 8 | 2 | 8 | 10 | 10 | 4 | 8 | 4 | 8 | 84 | 600 | 2 | 0.375 | 37.5 | 0.02 |
| vimala | 80 | 4 | 0 | 4 | 24 | 1 | 2 | 0 | 2 | 4 | 2 | 1 | 0 | 5 | 14 | 12 | 12 | 8 | 10 | 8 | 8 | 5 | 8 | 5 | 10 | 86 | 720 | 0 | 0.45 | 45.0 | 0.03 |
| ethiraju | 84 | 5 | 1 | 3 | 6 | 1 | 2 | 0 | 2 | 2 | 1 | 2 | 0 | 5 | 12 | 12 | 12 | 8 | 8 | 5 | 5 | 3 | 5 | 4 | 8 | 70 | 690 | 0 | 0.43125 | 43.1 | 0.03 |
| krishnavani | 60 | 1 | 0 | 4 | 120 | 2 | 2 | 2 | 2 | 6 | 2 | 2 | 3 | 5 | 22 | 12 | 12 | 8 | 8 | 8 | 5 | 4 | 5 | 3 | 5 | 70 | 660 | 1 | 0.4125 | 41.3 | 0.03 |
| shanthamani | 61 | 1 | 0 | 5 | 36 | 1 | 2 | 1 | 2 | 5 | 2 | 2 | 3 | 6 | 21 | 12 | 12 | 5 | 5 | 5 | 5 | 4 | 8 | 4 | 8 | 68 | 760 | 3 | 0.475 | 47.5 | 0.03 |
| rathinavelu | 73 | 3 | 1 | 4 | 18 | 1 | 2 | 3 | 3 | 6 | 2 | 1 | 5 | 6 | 26 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 760 | 0 | 0.475 | 47.5 | 0.03 |
| radhamani | 74 | 3 | 0 | 2 | 72 | 4 | 2 | 4 | 3 | 6 | 2 | 2 | 3 | 6 | 26 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 8 | 5 | 8 | 96 | 970 | 0 | 0.60625 | 60.6 | 0.04 |
| suriyanarayanan | 77 | 4 | 1 | 4 | 12 | 2 | 2 | 3 | 2 | 6 | 2 | 2 | 1 | 6 | 22 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 10 | 5 | 10 | 100 | 1200 | 4 | 0.75 | 75.0 | 0.05 |
| mohanraj | 60 | 1 | 1 | 5 | 24 | 1 | 2 | 1 | 2 | 6 | 2 | 2 | 1 | 5 | 19 | 15 | 15 | 8 | 8 | 8 | 8 | 4 | 8 | 5 | 8 | 87 | 930 | 7 | 0.58125 | 58.1 | 0.04 |
| Murugesan | 63 | 1 | 1 | 5 | 36 | 1 | 2 | 3 | 3 | 6 | 3 | 0 | 1 | 5 | 21 | 12 | 15 | 10 | 10 | 8 | 8 | 5 | 8 | 5 | 10 | 91 | 980 | 1 | 0.6125 | 61.3 | 0.04 |
| Aruchamy | 64 | 1 | 1 | 1 | 96 | 1 | 2 | 5 | 3 | 6 | 3 | 2 | 0 | 5 | 24 | 15 | 15 | 10 | 10 | 10 | 8 | 5 | 10 | 5 | 10 | 98 | 920 | 1 | 0.575 | 57.5 | 0.04 |
| Rajammal | 65 | 1 | 0 | 4 | 24 | 1 | 2 | 2 | 2 | 3 | 2 | 1 | 0 | 5 | 15 | 15 | 15 | 8 | 10 | 8 | 8 | 4 | 8 | 4 | 8 | 88 | 950 | 0 | 0.59375 | 59.4 | 0.04 |
| Palaniappan | 75 | 3 | 1 | 5 | 18 | 1 | 2.5 | 3 | 3 | 4 | 2 | 2 | 2 | 3 | 19 | 8 | 8 | 5 | 8 | 10 | 8 | 5 | 5 | 3 | 5 | 65 | 820 | 0 | 0.5125 | 51.3 | 0.03 |
| Rajamani | 60 | 1 | 1 | 1 | 60 | 3 | 2.5 | 5 | 3 | 6 | 1 | 2 | 3 | 6 | 26 | 15 | 12 | 10 | 10 | 8 | 5 | 5 | 5 | 5 | 10 | 85 | 1030 | 0 | 0.64375 | 64.4 | 0.04 |
| Reeja | 63 | 1 | 0 | 2 | 24 | 1 | 2.5 | 1 | 3 | 4 | 2 | 1 | 1 | 4 | 16 | 8 | 12 | 8 | 5 | 5 | 5 | 3 | 2 | 1 | 5 | 54 | 610 | 0 | 0.38125 | 38.1 | 0.02 |
| pappathi | 63 | 1 | 0 | 2 | 36 | 1 | 2.5 | 0 | 2 | 3 | 2 | 1 | 1 | 2 | 11 | 8 | 12 | 2 | 2 | 0 | 2 | 1 | 2 | 1 | 2 | 32 | 430 | 0 | 0.26875 | 26.9 | 0.02 |
| kandhasamy | 62 | 1 | 1 | 3 | 48 | 3 | 3 | 1 | 3 | 4 | 2 | 2 | 4 | 6 | 22 | 15 | 15 | 10 | 10 | 10 | 8 | 5 | 8 | 4 | 10 | 96 | 900 | 0 | 0.5625 | 56.3 | 0.04 |
| Kesavan | 67 | 2 | 1 | 3 | 204 | 4 | 3 | 2 | 2 | 6 | 2 | 2 | 2 | 6 | 23 | 12 | 12 | 8 | 8 | 8 | 5 | 4 | 8 | 4 | 5 | 74 | 550 | 0 | 0.34375 | 34.4 | 0.02 |
| perumals | 60 | 1 | 1 | 5 | 120 | 1 | 3 | 2 | 3 | 5 | 1 | 2 | 0 | 6 | 19 | 8 | 8 | 5 | 5 | 8 | 2 | 3 | 5 | 1 | 2 | 47 | 510 | 0 | 0.31875 | 31.9 | 0.02 |
| Jagatha | 65 | 1 | 0 | 2 | 60 | 2 | 3 | 1 | 2 | 3 | 1 | 1 | 2 | 3 | 13 | 12 | 12 | 8 | 8 | 8 | 5 | 4 | 8 | 4 | 8 | 79 | 800 | 0 | 0.5 | 50.0 | 0.03 |
| Sivakumar | 62 | 1 | 1 | 5 | 60 | 1 | 3 | 1 | 3 | 6 | 3 | 2 | 1 | 6 | 22 | 12 | 12 | 5 | 8 | 5 | 8 | 4 | 8 | 4 | 8 | 74 | 1160 | 1 | 0.725 | 72.5 | 0.05 |
| Thangaraj | 68 | 2 | 1 | 5 | 60 | 1 | 3 | 1 | 3 | 5 | 1 | 2 | 1 | 5 | 18 | 3 | 3 | 0 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 19 | 330 | 0 | 0.20625 | 20.6 | 0.01 |
| Santha Hariharan | 63 | 1 | 0 | 2 | 5 | 4 | 3 | 0 | 1 | 1 | 1 | 1 | 1 | 3 | 8 | 3 | 3 | 0 | 2 | 5 | 5 | 3 | 2 | 1 | 2 | 26 | 250 | 0 | 0.15625 | 15.6 | 0.01 |
| Saroja | 60 | 1 | 0 | 4 | 60 | 1 | 3 | 0 | 3 | 4 | 1 | 1 | 3 | 6 | 18 | 8 | 8 | 5 | 5 | 5 | 5 | 3 | 2 | 3 | 5 | 49 | 910 | 0 | 0.56875 | 56.9 | 0.04 |
| Thilagavathi | 76 | 4 | 0 | 2 | 36 | 1 | 3 | 0 | 2 | 3 | 2 | 0 | 0 | 6 | 13 | 8 | 8 | 5 | 5 | 5 | 5 | 4 | 5 | 3 | 5 | 52 | 760 | 0 | 0.475 | 47.5 | 0.03 |
| Lalithamani | 64 | 1 | 0 | 2 | 60 | 1 | 3 | 2 | 3 | 5 | 2 | 2 | 0 | 6 | 20 | 8 | 12 | 8 | 8 | 10 | 10 | 4 | 10 | 5 | 5 | 80 | 700 | 0 | 0.4375 | 43.8 | 0.03 |
| Prema | 60 | 1 | 0 | 2 | 36 | 1 | 3 | 4 | 3 | 5 | 2 | 1 | 5 | 5 | 25 | 15 | 15 | 8 | 8 | 8 | 10 | 5 | 10 | 4 | 10 | 93 | 780 | 0 | 0.4875 | 48.8 | 0.03 |
| Lalitha | 74 | 3 | 0 | 2 | 168 | 1 | 4 | 1 | 2 | 4 | 2 | 1 | 3 | 5 | 18 | 8 | 8 | 5 | 8 | 8 | 5 | 5 | 10 | 5 | 10 | 65 | 630 | 0 | 0.39375 | 39.4 | 0.02 |
| Dharmambal | 65 | 1 | 0 | 2 | 36 | 1 | 4 | 0 | 2 | 3 | 2 | 1 | 3 | 5 | 16 | 12 | 12 | 5 | 2 | 5 | 5 | 3 | 2 | 1 | 2 | 50 | 470 | 0 | 0.29375 | 29.4 | 0.02 |
| Ruckumani | 78 | 4 | 0 | 1 | 120 | 2 | 4 | 1 | 3 | 4 | 1 | 1 | 4 | 4 | 18 | 3 | 3 | 0 | 2 | 2 | 2 | 3 | 5 | 3 | 5 | 28 | 230 | 0 | 0.14375 | 14.4 | 0.01 |
| Jothi | 64 | 1 | 0 | 2 | 72 | 4 | 4 | 4 | 2 | 5 | 2 | 2 | 3 | 6 | 24 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | 3 | 2 | 21 | 390 | 0 | 0.24375 | 24.4 | 0.02 |
| Palaniswamy | 67 | 2 | 1 | 1 | 36 | 4 | 4 | 0 | 1 | 1 | 1 | 1 | 0 | 2 | 6 | 8 | 12 | 8 | 8 | 2 | 2 | 0 | 2 | 1 | 5 | 48 | 500 | 0 | 0.3125 | 31.3 | 0.02 |
| Amirthavalli | 60 | 1 | 0 | 2 | 72 | 1 | 4 | 1 | 3 | 6 | 2 | 2 | 3 | 6 | 23 | 12 | 12 | 5 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | 43 | 430 | 0 | 0.26875 | 26.9 | 0.02 |
| Vasanthadevi | 72 | 3 | 0 | 2 | 180 | 1 | 4 | 4 | 2 | 5 | 2 | 2 | 2 | 6 | 23 | 15 | 15 | 10 | 10 | 10 | 10 | 5 | 5 | 3 | 8 | 91 | 1020 | 0 | 0.6375 | 63.8 | 0.04 |
| Marappan | 75 | 3 | 1 | 1 | 84 | 2 | 4 | 0 | 1 | 1 | 1 | 0 | 0 | 3 | 6 | 3 | 8 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 17 | 320 | 1 | 0.2 | 20.0 | 0.01 |
| Sankara warr | 73 | 3 | 1 | 4 | 72 | 2 | 4 | 2 | 1 | 3 | 2 | 1 | 1 | 3 | 13 | 8 | 8 | 5 | 5 | 5 | 5 | 4 | 5 | 4 | 8 | 57 | 690 | 0 | 0.43125 | 43.1 | 0.03 |
| Arangannan | 85 | 5 | 1 | 4 | 48 | 2 | 4 | 2 | 3 | 3 | 2 | 0 | 1 | 6 | 17 | 8 | 8 | 5 | 5 | 5 | 5 | 3 | 5 | 3 | 8 | 55 | 430 | 3 | 0.26875 | 26.9 | 0.02 |
| Meenakshi | 70 | 2 | 0 | 1 | 72 | 1 | 4 | 0 | 2 | 4 | 2 | 1 | 1 | 5 | 15 | 8 | 8 | 8 | 5 | 8 | 5 | 3 | 2 | 3 | 5 | 55 | 0 | | 0 | 0.0 | 0.00 |
| Balasubramanian | 63 | 1 | 1 | 3 | 48 | 3 | 4 | 0 | 2 | 4 | 3 | 2 | 2 | 6 | 19 | 12 | 8 | 5 | 8 | 5 | 5 | 3 | 5 | 1 | 2 | 54 | 440 | 0 | 0.275 | 27.5 | 0.02 |
| Chellathal | 69 | 2 | 0 | 1 | 120 | 1 | 5 | 0 | 2 | 1 | 1 | 0 | 2 | 5 | 11 | 0 | 0 | 0 | 2 | 2 | 2 | 1 | 0 | 1 | 0 | 8 | 260 | 0 | 0.1625 | 16.3 | 0.01 |
| Kmalathal | 64 | 1 | 0 | 2 | 48 | 2 | 5 | 0 | 2 | 1 | 1 | 0 | 1 | 4 | 9 | 3 | 3 | 2 | 2 | 0 | 2 | 1 | 0 | 0 | 0 | 13 | 170 | 0 | 0.10625 | 10.6 | 0.01 |